EFFECTIVENESS OF BUERGER'S ALLEN EXERCISE ON IMPROVING LOWER EXTREMITY PERFUSION AMONG PATIENTS WITH DIABETES MELLITUS

BY

LEELAVATHI. M

A DISSERTATION SUBMITTED TO THE TAMILNADU DR.M.G.R MEDICAL UNIVERSITY, CHENNAI IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN NURSING

OCTOBER 2015

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DECLARATION

I hereby declare that the present dissertation entitled **"Effectiveness of Buerger's Allen exercise on improving lower extremity perfusion among patients with diabetes mellitus"** is the outcome of the original research work undertaken and carried out by me under the guidance of **Dr.Latha Venkatesan,** M.Sc (N)., M.Phil (N)., Ph.D (N)., M.B.A Principal, Apollo College of Nursing and **Mrs.Kanchana.G** M.Sc.(N).,M.Sc.(psy)., Reader, Apollo College of Nursing, Chennai. I also declare that the material of this has not found in any way, the basis for the award of any degree or diploma in this university or any other university.

M.Sc (N) II Year

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SYNOPSIS

A Quasi Experimental Study to Assess the Effectiveness of Buerger's Allen exercise on Improving the Lower Extremity Perfusion among patients with Diabetes Mellitus admitted at Apollo hospitals, Chennai

The Objectives of the study were,

1. To assess the lower extremity perfusion in control and experimental group of patients with diabetes mellitus before and after Buerger's Allen exercise.
2. To evaluate the effectiveness of Buerger's Allen exercise by comparing lower extremity perfusion in control and experimental group of patients with diabetes mellitus before and after Buerger's Allen exercise.
3. To determine the level of satisfaction in patients with diabetes mellitus regarding Buerger`s Allen exercise.
4. To find out the association between the selected demographic variables and the lower extremity perfusion in control and experimental group of patients with diabetes mellitus before and after Buerger's Allen exercise.
5. To find out the association between the selected clinical variables and lower extremity perfusion on Buerger's Allen exercise in control and experimental group of patients with Diabetes mellitus before and after Buerger's Allen exercise.

The conceptual framework for the present study is based on **Sister Callista Roy's Adaptation Model**. According to Sister Callista Roy's Nursing is defined as a practice centred discipline geared towards persons and their responses to stimuli and adaptation to the environment. This model is based on the concepts of input, throughput and output.

The investigator used demographic variable proforma, clinical variable proforma, Inlow's 60 second screening tool and rating scale for the level of satisfaction on Buerger's Allen exercise were the various tools used by the researcher. The validity was obtained from various experts and reliability was obtained through test retest evaluation and found to be highly reliable. The main study was conducted after the pilot study.

The investigator collected the data from Apollo Main Hospital, Greams road, Chennai and Apollo Speciality Hospital, Vanagaram, Chennai. The observation time schedule was from 7 a.m. – 12 noon and 12.30 p.m. – 5.30 p.m. and the data collection period was from December 1st (2014) to January 15th 2015.

Sixty patients with Diabetes mellitus were selected using purposive sampling technique. They were assigned 30 each in experimental and control group. The baseline data of demographic variable and clinical variable was collected before the intervention in both control and experimental group. The lower extremity perfusion was assessed before the intervention for both control and experimental group with Diabetes mellitus patients based on Inlow's 60-second Diabetic Foot Screening Tool.

Buerger's Allen exercise was given for Diabetes mellitus patients for 10 min for 5 days to experimental group. Post test was conducted at 6th day of intervention. Then the level of satisfaction regarding foot massage was assessed using the satisfaction rating scale for experimental group. The collected data was tabulated and analyzed using descriptive and inferential statistics like mean, standard deviation, student 't' test and chi square.

Major Findings of the Study

- Most of the patients with diabetes mellitus were males (53.3%, 70.0%), duration of stay in hospital was 4-6 days (56.7%, 60.0%,), and they had two

children (63.3%, 46.7%,). Majority of them were Hindus by religion (66.7%, 86.7%), were from nuclear family (90.0%, 90.0%), and with monthly income of > Rs.10,000 (83.3%, 96.75) and 10% and 90% of the patients were married in control and experimental group respectively.

- Most of the patients with diabetes mellitus were smokers (70.0%, 53.3%), had habit of consuming alcohol (70.0%, 56.7%) and were known to have heart disease (66.7%, 56.7%). Around half of the patients with diabetes mellitus had body mass index (BMI) of 25-29 (43.3%, 43.3%), were taking non vegetarian diet twice in a week (33.3%, 53.3%) and sedentary workers (73.3%, 46.7%). Significant percentage of patients had family history of diabetes mellitus from parents (30%, 43.3%) in control and experimental group respectively. None of them had non pharmacological treatment, co morbid disease and the history of chewing tobacco (100%,100%).
- There was no significant difference in the mean perfusion scores of pre test (M=21.6, S.D=3.71) in the control group and (M=21,S.D=2.41) in the experimental group at $p > 0.005$, where as there was significant difference in mean perfusion scores of post test (M=20.5, S.D =3.192) in control group and (M=7.83, S.D=2.913) in experimental group at $p < 0.001$. Hence null hypothesis ''H_O1 There will be no significant difference between the lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after administration of Buerger's Allen exercise.'' was rejected
- Significant difference in the lower extremity perfusion score before and after the Buerger's Allen exercise were identified in patients with Diabetes mellitus with 't' value of 16.24 at $p <0.001$ level. Hence null hypothesis ''H_O1 There

will be no significant difference between the lower extremity perfusion in control and experimental group of patients with diabetes mellitus before and after administration of Buerger's Allen exercise.'' was rejected.

- Significant percentage of the patients with diabetes mellitus were satisfied with the Buerger's Allen exercise, majority of them were highly satisfied (73.3%) and none of them expressed dissatisfaction. This interprets that Buerger's Allen exercise is highly effective in improving lower extremity perfusion. Although there are various methods to improve the lower extremity perfusion among patients with Diabetes mellitus, this intervention is simple and effective method.
- No significant association between selected demographic variables and the lower extremity perfusion were noticed in patients with Diabetes Mellitus in control and experimental group. Hence null hypothesis'' H_O3 There will be no significant association between the demographic variables and lower extremity perfusion in control and experimental group of patients with diabetes mellitus before and after administration of Buerger's Allen exercise'' was retained.
- Significant association between the selected clinical variable of Body Mass Index (χ^2 =6.652*, df=1) , (χ^2 =1.292, df = 1) and lower extremity perfusion in patients with Diabetes Mellitus at $p< 0.05$ in control group and experimental group respectively. Hence null hypothesis ''H_O4 There will be no significant association between the clinical variables and the lower extremity perfusion in control and experimental group of patients with diabetes mellitus before and after administration of Buerger's Allen exercise'' with regard to body mass index, was rejected. However, other clinical variables had no significant association with lower extremity perfusion in

patients with Diabetes mellitus in control and experimental group. Hence null hypothesis H_O4 with regard to the clinical variables like habit of taking non vegetarian diet, habit of chewing tobacco, habit of smoking, nature of physical activity, history of Diabetes mellitus, i.e., H_O4 ''There will be no significant association between the clinical variables and the lower extremity perfusion in control and experimental group of patients with diabetes mellitus before and after administration of Buerger's Allen'' was partially retained.

Recommendations

The researcher recommends the following studies

- The same study can be conducted on larger samples for better generalization.
- The similar study could be replicated in different settings
- A comparative study could be conducted to evaluate the effectiveness of Buerger's Allen exercise with other non pharmacological agents and alternative therapies.
- The similar study can be conducted to assess the effectiveness of Buerger's Allen exercise in different age groups.
- A study can be conducted on the quality of life among Diabetes mellitus patient

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CHAPTER - I

INTRODUCTION

Background of the Study

"Diabetes: protect our future."

(World diabetes day theme, 2014-2016)

Health is a dynamic condition resulting from a body's constant adjustment and adaptation in response to stresses and changes in the environment for maintaining an inner equilibrium. Wellness is first and foremost a choice to assume responsibility for the quality of your life. It begins with a conscious decision to shape a healthy lifestyle. Wellness is a mind set, a predisposition to adopt a series of key principles in varied life areas that lead to high levels of well-being and life satisfaction.

Diabetes Mellitus is a chronic disease, which occurs when the pancreas does not produce enough insulin, or when the body cannot effectively use the insulin it produces. This leads to an increased concentration of glucose in the blood called as hyperglycaemia. Type II diabetes mellitus formerly called non-insulin-dependent or adult-onset diabetes is caused by the body’s ineffective use of insulin. It often results from excess body weight and physical inactivity.

The global prevalence of diabetes mellitus estimated to increase from 4% in 1995 to 5.4 % by the year of 2025. The world health organization has predicted that the major burden will occur in developing countries 84-228 million. Diabetes mellitus is fast gaining status of a potential epidemic in India with more than 62 million diabetic individuals currently diagnosed with the disease. In 2000, India 31.7 million topped the world with the highest number of people with diabetes mellitus followed by China 20.8

million with the United States 17.7 million in second and third place respectively. (WHO 2014).

According to Wild et al, 2000 the prevalence of diabetes mellitus is predicted to double globally from 171 million in 2000 to 366 million in 2030 with a maximum increase in India. It is predicted that by 2030 diabetes mellitus may afflict up to 79.4 million individuals in India, while China 43.2 million and the United States 30.3 million will also see significant increases in those affected by the disease. India currently faces an uncertain future in relation to the potential burden that diabetes may impose upon the country. Many influences affect the prevalence of disease throughout a country, and identification of those factors is necessary to facilitate change when facing health challenges.

Preliminary results from a large community study conducted by the Indian Council of Medical research (ICMR) 2012 revealed that a lower proportion of the population is affected in states of Northern India Chandigarh 0.12 million, Jharkhand 0.96 million as compared to Maharashtra 9.2 million and Tamil Nadu 4.8 million. The National Urban Survey conducted across the metropolitan cities of India reported similar trend 11.7 per cent in Kolkata, 6.1 per cent in Kashmir Valley Northern India, 11.6 per cent in New Delhi , and 9.3 per cent in Mumbai compared with 13.5 per cent in Chennai, 16.6 per cent in Hyderabad, and 12.4 per cent Bangalore. (Chanda, 2012).

As per the report of international diabetes federation (IDF) India is looming epidemic of diabetes, and known as the capital for diabetes. According to IDF, India has highest number of, 50.8 million people suffering from Diabetes Mellitus, followed by China 43.2 million and the US 26.8 million. The report projected 58.7 million Diabetes Mellitus case in India by the year of 2010- almost 7% of the adult

population in the developing countries. More over 3.2 million deaths are due to Diabetes Mellitus. Obesity is one of the major risk factors for diabetes, yet there has been little research focusing on this risk factor across India. Despite having lower overweight and obesity rates, India has a higher prevalence of diabetes compared to western countries suggesting that diabetes may occur at a much lower body mass index (BMI) in Indians compared with Europeans (Rajabharan, 2008).

Lean Indian adults with a lower BMI may be at equal risk as those who are obese. Furthermore, Indians are genetically predisposed to the development of coronary artery disease due to dyslipidiemia and low levels of high density lipoproteins; these determinants make Indians more prone to development of the complications of diabetes at an early age 20-40 years compared with Caucasians >50 years and indicate that diabetes must be carefully screened and monitored regardless of patient age within India (William , 2007).

The acute and chronic complication of diabetes mellitus is the major cause of hospital admission. Asian patients had more evidence of micro and macrovascular complication. The prevalence of micro and macro vascular complications is more in Asians with 66.4% and it is 44.2% more in European populations. Among these macro vascular complications which accounts for 27.8%. The acute and chronic complication of diabetes mellitus is the major cause of hospital admission (Rajasekhar, 2005).

PAD, often called peripheral arterial disease or peripheral vascular disease or PVD, is a condition that develops when the arteries in the legs and feet become narrowed, or blocked, by an accumulation of a fatty substance called plaque, which builds up on the inside walls of the arteries. This narrowing is also called stenosis. As

the arteries narrow, blood supply to the muscles and tissues in the legs and feet decreases, causing pain, poor healing, and in severe cases tissue death or gangrene.

Lower extremity PAD is one manifestation of atherosclerosis: the hardening and narrowing of the arteries due to plaque build-up. Atherosclerosis is a systemic disease occurring throughout the body. It affects as many as 35 percent of Americans. People with lower extremity arterial disease often have other cardiovascular problems caused by atherosclerosis, such as carotid artery disease and heart disease (Sharma, 2011).

Diabetes mellitus is an important risk for Lower extremity arterial disease (LEAD). LEAD in Diabetes mellitus compound by the presence of peripheral vascular disease neuropathy and suspects for infections. Among these macrovascular complications which accounts for 27.8%. Mortality rate is increases patient with LEAD, Particular of foot ulceration, or gangrene. Three year survival rate of amputation is < 50% (Palumbo, 2011).

In the U.S., 12% of individuals have PVD. PVD is an independent factor for cerebral vascular death. Approximately 4-8% of patients with PVD require amputation. PVD have at least 30% risk of death from myocardial infarction (MI) or cerebrovascular accident (CVA) within 5 years and risk with approximately 50% in 10 years. In India the percentage of peripheral vascular disease among patients with diabetes mellitus accounts for 21% at Chennai, 24% at Madurai, and 11 % at Delhi (Oidyo Nicholas et al., 2001).

Exercise training for prevention of peripheral vascular disease among diabetes mellitus patients helps in potential mechanisms like formation of collateral circulation and increased blood flow, changes micro circulation and endothelial functions, changes in muscle metabolism and oxygen extraction, prevention of inflammation and muscle

injury, cost effective, preventing atherosclerosis and prothrombotic risk factors. Buerger ‘s Allen exercise has shown an effect on improving peripheral circulation. Buerger’s Allen exercise is an active postural exercise in which gravity alternatively fills and empties the blood vessels for preventing Peripheral vascular diseases (PVD) and promoting collateral circulation in lower extremities.

According to the Center for disease control and prevention, diabetes mellitus is the leading cause of non traumatic limb amputation which is 15- 40 fold increases the risk over the non diabetes population. In 2004 about 71,000 non traumatic limb amputations is performed related to neuropathy and vascularpathy (CDC,2004).

Need for the Study

Exercise is the fundamental principle for preventing the PVD among diabetes mellitus patient’s. A study was conducted to assess the effectiveness of the exercise programme on glucose control and risk factors for complications in type II diabetes mellitus patients. The study was done on three different measures (aerobic, resistance and combined training). The study was lasted for >12 weeks among 1003 type II Diabetes Mellitus patients. The study concluded that all form of exercise programme have benefit on controlling blood glucose similar like dietary, drug and insulin treatments and have clinical importance (Harding, 2007).

Globally, as of 2010, estimated that 285 million people had diabetes, with type II making up about 90% of the cases. Its incidence is increasing rapidly and by 2030, this number is estimated to almost double. Diabetes mellitus occurs throughout the world, but type II is more common in the developed countries. The greatest increase in prevalence is, however, expected to occur in Asia and Africa, where most patients will

probably be found by 2030. This has suggested an environmental dietary effect, but there is little understanding of the mechanisms at present, though there is much speculation, some of it most compellingly presented. (Roglic, 2005).

The Chennai Urban Rural Epidemiology Study (CURES) is a large cross-sectional study carried out in Chennai, using systematic random sampling, wherein from the 155 wards, 46 were selected from which 26,001 individuals were selected to represent all the 10 corporation zones of Chennai. The data from CURES was used to develop The Indian Diabetes Risk Score (IDRS), Receiver Operating Curves (ROC) was constructed to identify the optimum value ≥ 60% of IDRS for determining diabetes as diagnosed using WHO Consulting Group Criteria. The results indicate that an IDRS value ≥60 had the optimum sensitivity 72.5% and specificity 60.1% for determining undiagnosed diabetes in the community with a positive predictive value of 17.0% negative predictive value of 95.1% and accuracy of 61.3% (Deepa, 2003).

According to the Indian Council of Medical Research-Indian Diabetes study (ICMR-INDIAB) (2010) a national diabetes study reveals that India currently has 62.4 million people with diabetes. This is set to increase to over 100 million by 2030. The majority of people with diabetes >90% have Type II diabetes. The Chennai Urban Population Study [CUPS] is one of the few longitudinal epidemiological studies on diabetes conducted in India till date. The CUPS showed that subjects with IDRS score ≥60 at baseline also had the highest proportion of conversion to diabetes was 27.8% followed by those with medium risk score of IDRS 16.9% and was lowest in those with low IDRS <30, 5.6%, $P < 0.001$. Even after adjusting for age and gender, the relative risk (RR) for incident diabetes remained significant (IDRS ≥ 60: RR 3.1, $P = 0.035$, IDRS 30-50: RR 2.7, $P = 0.032$). Thus a high IDRS can be useful to identify those who

are likely to develop diabetes or pre-diabetes in the future, even if they have normal glucose tolerance now.

An article “India’s diabetes burden to cross 100 million by 2030” published in times of India states that the global diabetes numbers are out, and it's not looking too good for India. India is home to over 61 million diabetic patients - an increase from 50.8 million last year. By 2030, India's diabetes burden is expected to cross the 100 million mark as against 87 million earlier estimated. The country is also the largest contributor to regional mortality with 983, 000 deaths caused by diabetes this year (Sinha, 2006).

The International Diabetes Federation's (IDF) fifth diabetes atlas has released the staggering figures. IDF says India's prevalence of diabetes among 20-79 year olds is 9.2%. "One person is dying from diabetes every seven seconds. According to the IDF, the total number of people with diabetes this year reached a staggering 366 million with 4.6 million deaths. Healthcare spending on diabetes has reached $465 billion. (IDF, 2008)

Approximately 40 % people with PVD is having diminished ability to perform daily activities. A Study was conducted among 14 patients showing that the subcutaneous blood flow is increase in seven patients temporarily within 24 hour by doing Buerger’s Allen exercise. Buerger’s Allen exercises an active postural exercise (gravity alternatively fills and empties the blood vessels) for preventing PVD and promoting collateral circulation in lower extremities.

According to “Save India Campaign” screening programme for vascular disease on “National Vascular Week”, in India one in every 20 Indians over the age of 40 has peripheral arterial disease and it is estimated to affect more than 9 million people in

India. The estimated number of asymptomatic individuals varies widely from 20% to 50%. (Sinha, 2008)

As per the "Healthy People Program" (2007) prevention of problems of diabetic foot are the major goal. Peripheral neuropathy contributes to diabetic foot complications and the possibility of ulceration of lower extremities in the diabetic patients is approximately 15 -59 times more than in the non diabetic individuals. Around 45-70% of diabetic traumatic amputations results from diabetic peripheral neuropathy.

A study conducted by Kiyomi Matsuo et al, 2013 from International University of health and welfare, Japan on the basis of the effect of different positions on lower limbs skin perfusion pressure on diabetes clients. The subjects of this study were 10 healthy adults and 11 patients with critical limb ischemia. Patients with critical limb ischemia, including both dorsum of foot and plantar of foot, having SPP of lower limbs of less than 40 mmHg (supine position) were the object of this study. SPP was measured on four positions (supine position, lower limbs elevation position, sitting position, and reclining bed elevation of 20° position). From the above study it's clearly meant that the different steps of Buerger's Allen exercise is useful in improving lower extremity perfusion.

Exercise training for prevention of peripheral vascular disease among patients with diabetes mellitus helps in potential mechanisms like formation of collateral circulation and increased blood flow, changes micro circulation and endothelial functions, changes in muscle metabolism and oxygen extraction, prevention inflammation and muscle injury, cost effective, preventing atherosclerosis and prothrombotic risk factors.

The need for the study clearly suggests that peripheral neuropathy is a major cause for morbidity and disability of the diabetes community. Exercise training Buerger's Allen exercise for improving lower extremity perfusion among diabetic patient helps in potential mechanisms like formation of collateral circulation and increased blood flow, changes micro circulation and endothelial functions, changes in muscle metabolism and oxygen extraction, prevention of inflammation and muscle injury, cost effective, and preventing atherosclerosis.

Thus the investigator was interested to conduct the study to assess the effectiveness of Buerger's Allen exercise on improving the lower extremity perfusion among patients with Diabetes mellitus.

Statement of the Problem

A Quasi Experimental Study to Assess the Effectiveness of Buerger's Allen exercise on Improving the Lower Extremity Perfusion among Patients with Diabetes Mellitus admitted at Apollo hospitals, Chennai.

Objectives of the Study

1. To assess the lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after Buerger's Allen exercise.
2. To evaluate the effectiveness of Buerger's Allen exercise by comparing lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after Buerger's Allen exercise.

3. To determine the level of satisfaction in patients with diabetes mellitus regarding Buerger`s Allen exercise.
4. To find out the association between the selected demographic variables and the lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after Buerger's Allen exercise.
5. To find out the association between the selected clinical variables and the lower extremity perfusion in control and experimental group of patients with diabetes mellitus before and after Buerger's Allen exercise.

Operational Definitions

Effectiveness

In this study, effectiveness refers to the significant improvement in the lower extremity perfusion among patients with Diabetes Mellitus as measured by Inlow's 60 second Diabetic foot screening tool.

Buerger's Allen Exercise

In this study, it refers to an active postural exercise (elevation, dependency, horizontal) of the lower extremity which helps to fill and empty blood vessels according to gravity alternatives and to improve its collateral circulations among patients with diabetes mellitus.

Step.1 Patients were asked to lie down and elevate the feet on padded chair or board for ½ to 3 minutes

Step.2 patients are advised to sit in relaxed position while each foot is flexed and extended then pronated and supinated for 3 minutes. The feet should become entirely pink. If the feets are blue or painful , elevate them and relax as necessary.

Step.3 Patients were asked to lie down quietly for 5 minutes, keeping the legs warm with a blanket. It should be repeated for 5 times. After the intervention on the 4th day post test was conducted for checking whether the lower extremity perfusion has improved or not with the use of blanket and pillow.

Lower Extremity Perfusion

In this study, it refers to the adequate blood circulation of the lower extremity as evidenced by skin colour changes, decreased pain and edema after administering the Buerger's Allen exercise among patients with diabetes mellitus as measured by Inlow`s screening tool.

Diabetes Mellitus Patients

In this study, it refers to male and female adults who are diagnosed to have type II diabetes mellitus in the selected hospital and on medical management during the period of study.

Assumptions

The study assumes that,

- Elderly are at risk for developing diabetes mellitus.
- Diabetes mellitus is a modifiable major risk factor of heart attack, heart failure and is a leading cause of foot ulcer.
- Foot ulcer can be prevented by maintaining adequate blood supply to the lower extremities
- Buerger's Allen exercise helps to fill and empty blood vessels according to gravity alternatives and improves its collateral circulations.

Null Hypotheses

H_O1 There will be no significant difference between the lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after Buerger's Allen exercise.

H_O2 There will be no significant association between the effectiveness of Buerger's Allen exercise by comparing lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after Buerger's Allen exercise.

H_O3 There will be no significant association between the demographic variables and the lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after Buerger's Allen exercise.

H_O4 There will be no significant association between the clinical variables and the lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after Buerger's Allen exercise.

Delimitations

The study was limited to:

- 4 weeks of data collection.
- Diabetes mellitus patients who are admitted for treatment.
- Patients who are willing to participate in the study.
- Patients who can understand English.

Conceptual Framework

Conceptual Framework is interrelated concepts or abstractions that are assembled together in some rational schemes by virtue of their relevance to a common theme (Polit & Beck 2012).

The conceptual framework for the present study is based on **Sister Callista Roy's Adaptation Model**. According to Sister Callista Roy's Nursing is defined as a practice centered discipline geared towards persons and their responses to stimuli and adaptation to the environment. This model is based on the concepts of input, throughput and output.

Input

Input refers to administration of Buerger's Allen exercise among experimental group of patients with Diabetes mellitus to improve lower extremity perfusion.

External stimuli

An external stimulus means anything which is outside from the body such as lack of exercise, smoking, alcoholism, chewing tobacco.

Internal stimuli

Internal stimuli means within our body itself had some changes that may be responsible for the lower extremity perfusion such as age, gender, skin, nails, temperature, pulse and co morbid disease.

Process

Process includes the coping mechanism. There are two types, regulators and cognators.

Regulators

Regulators are the subsystem of coping mechanism that responds automatically through neural, chemical and endocrine process.

Cognators

Cognators are the subsystems of coping mechanism that responds through complex process of perception and information processing, learning, judgment and emotion.

Effectors

The regulator and cognator mechanism work within the four adaptive modes like effectors of physiological function, self-concept, and role function and interdependence.

Physiological Functioning

These are the ways of dealing with regard to improvement of lower extremity perfusion. It includes lower extremities and Buerger's Allen exercise.

Self Concept

It is a composite of beliefs and feeling. It refers to the client's level of satisfaction regarding Buerger's Allen exercise.

Role Function

Set of expectation about how a person occupying one position behaves towards a person occupying another position. Focused on the roles like primary, secondary and tertiary roles.

Interdependence

It is the interdependence role between the researcher and patients with Diabetes Mellitus to improve lower extremity perfusion.

Output

Output can be categorized into adaptive or maladaptive responses. In adaptive response, the patient will have adequate lower extremity perfusion. In maladaptive response, the patient will have poor lower extremity perfusion. These responses provide feedback for the system.

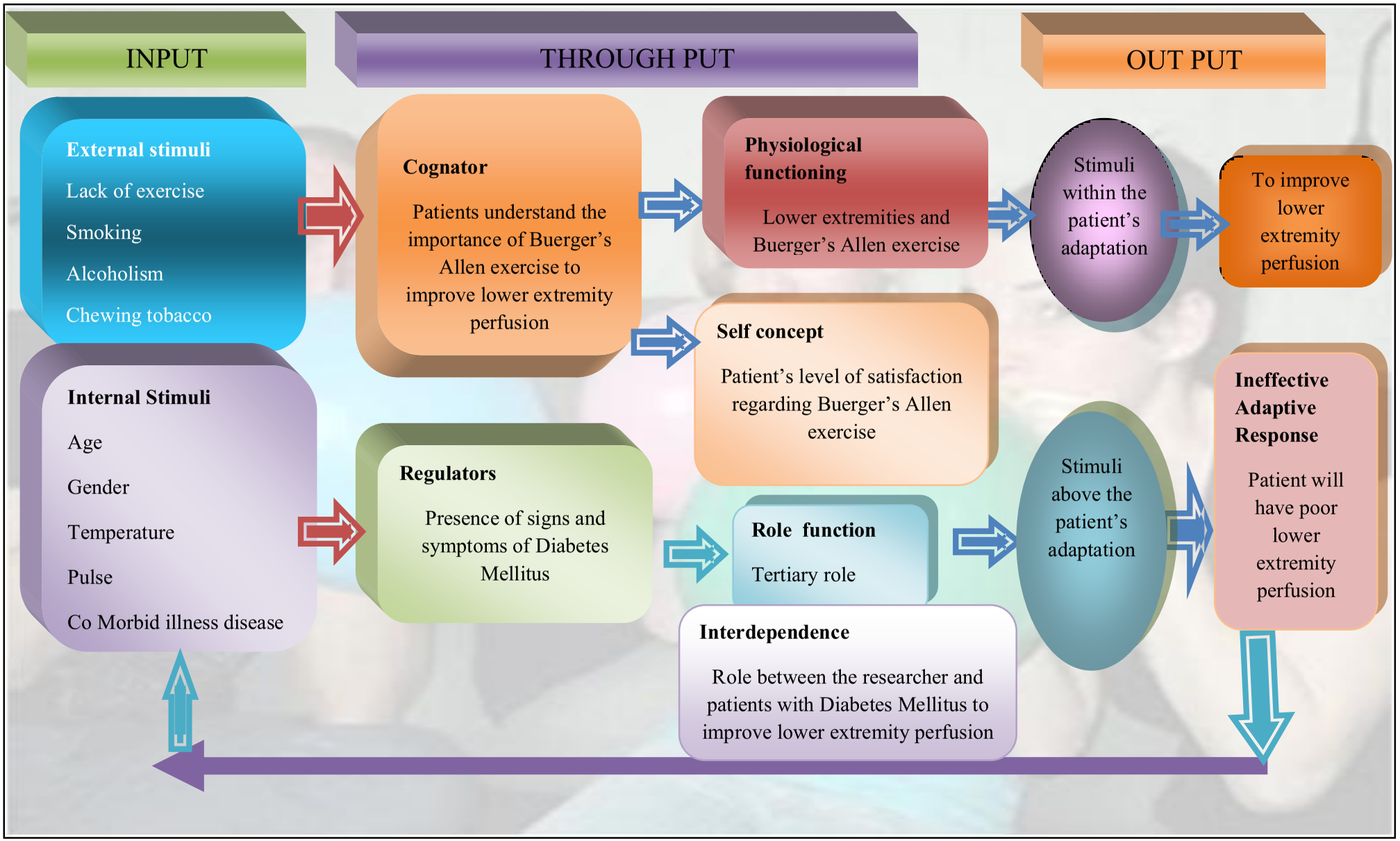

Figure.1. Conceptual Frame Work Based On "Modified Roy's Adaptation Model"

Projected Outcome

The study will help to provide evidence based guidelines for improving the lower extremity perfusion among patients with Diabetes Mellitus and increases the knowledge and practice among nurses regarding Buerger's Allen exercise that helps to prevent complications. Buerger`s Allen exercise increases the satisfaction of patients and reduces the length of stay in the hospital.

Summary

This chapter has dealt with the background, need for the study and statement of the problem, objectives, operational definitions, assumptions, null hypothesis, delimitations and conceptual framework.

Organization of the Report

Further aspects of the study are presented in the following five chapters.

Chapter –II: Review of literature

Chapter –III: Research methodology which include research approach, research design, setting, population, sample, sampling technique, tool description, validity and reliability of tools, pilot study, intervention protocol, data collection procedure and plan for data analysis.

Chapter IV: Analysis and interpretation of the data

Chapter V: Discussion

Chapter VI: Summary, Conclusion, implication and recommendations and limitations

CHAPTER II

REVIEW OF LITERATURE

A literature review involves the systematic identification, location, scrutiny, and summary of written materials that contain information on the research problem (Polit and Hungler, 2012).

This chapter deals with a review of published and unpublished research studies and from related material for the present study. The review helps the investigator to develop an insight into the problem area. This helped the investigator in building the foundation of the study.

The review of literature is presented under the following headings.

- **Literature related to diabetes mellitus.**
- **Literature related to lower extremity perfusion among patients with diabetes mellitus.**
- **Literature related to Buerger's Allen exercise to improve lower extremity perfusion among patients with diabetes Mellitus.**

Literature related to diabetes mellitus

Premalatha (2013) conducted a study to find out the prevalence and incidence of chronic complications and mortality in a cohort of type II diabetes mellitus patients . The study was done in 317 type II diabetes mellitus patients treated at a Primary Care Centre, followed for 10 years. The result of the study showed the prevalence of an increase in nephropathy 12%, in retinopathy 6.2% and in neuropathy 2.1%, a decrease in ischemic cardiomyopathy 6.2%, an increase in peripheral vascular disease 5.6%.

Cerebrovascular, events and diabetic foot remaining unchanged. The highest incidence rates (1000 subjects/year) were nephropathy 43%, neuropathy 39% and ischemic cardiomyopathy 12% .

A comparative study conducted by Viswanathan (2012) to assess the association of diabetes retinopathy and other micro vascular complications in case of diabetes mellitus. The study included 129 diabetic patients and cases were divided into 3 groups according to their duration, type of diabetes mellitus and non compliance to management. The result of the study shows that, prevalence of retinopathy in group 1 was 34.45 in group 2 was 12.4% in type I diabetes mellitus as compared with group1 and group 3 which was 25.5%. The difference was statistically significant showed that diabetic retinopathy associated with all types of diabetes mellitus. The incidence of nephropathy and neuropathy are also more in all type of diabetes mellitus.

Literature related to lower extremity perfusion among patients with Diabetes Mellitus

The second national health and nutritional examination survey (2014) reported that the prevalence of the diminished or absents of the dorsalis pedis artery pulse found in 16.2% of adult with the age of 35-54 years and 23.5% of those of 55-74 years. This rates are considerably higher than non diabetes patient. According to National Hospital Discharge Survey (NHDS) 16.2% of diabetes patient is having peripheral vascular disease which is 3.2% higher than non-diabetes patients. The study concluded that the prevalence of vascular disease is frequently more in diabetes patients as comparing with non-diabetes patients.

A community based study was conducted by Fran (2014) showed the prevalence of peripheral vascular diseases in diabetes and impaired glucose regulation. The aim of

the study was to investigate the prevalence of the PVD in the patients with DM and impaired glucose regulation (IGR) This study conducted in 717 patients in with DM or IGR. The study revealed that overall prevalence of PVD was 12.2% in the hyperglycemic population. The prevalence of PVD in diabetes patients were 15.1% significantly higher than of the IGR subjects 7.7%. The study concluded that the age, sex, diabetic duration and total cholesterol level were independent risk of diabetic peripheral vascular disease and the prevalence of PVD is common in DM as well as IGR subjects.

Mohan et al. (2013) conducted a study in Chennai for the prevalence of PVD among DM patients. The purpose of the study was to find out the prevalence of the PVD among south Indian patients, in two colonies in Chennai. The study was done in three groups: Normal, impaired and diabetes patients. The overall prevalence of the PVD is 3.2%, among these prevalence 6.3% is alone consisted by diabetes patients. The study concluded that the prevalence of PVD was higher in 7.8% in diabetic patient than with newly diagnosed DM patients.

A comparative study conducted by Treesak (1993) to quantify the distribution of the peripheral vascular disease in diabetes and non diabetes patients attending angiography and to compare, severity and the outcome between both groups of patients. The study was conducted in 136 patients and 58(43%) patients were diabetic. This study was confirmed that diabetes mellitus patients have more worsened peripheral vascular disease and are at high risk lower extremity amputation than non-diabetes patients. Diabetes mellitus patients with peripheral vascular disease also had high mortality and died at a younger age than non diabetes patient.

Literature related to Buerger's Allen exercise to improve lower extremity perfusion among patients with diabetes mellitus

Vincent (2015) published an article regarding conservative approach to the management of lower extremity associated signs and symptoms (pain, edema, tenderness, cyanosis, coldness and stiffness) show the effectiveness of Buerger's Allen exercise. The treatment involve encouragement of blood flow during the actively vasospastic phase by elevation of an active exercise part. The researcher recommended that Buerger's Allen Exercise has effect the improvement of lower extremity blood supply. Intermittent claudication is highly recommended for the importance of Buerger's Allen exercise (three series of exercise repeat 6-7 times in a day) among peripheral vascular disease.

An experimental study was conducted by Jacobson (2014) to determine the cost effectiveness of exercise training to improve Claudication symptoms in peripheral arterial disease. The study was conducted comparing percutaneous transluminal angioplasty (PTA) and exercise rehabilitation. The effectiveness was assessed three and six months exercise programme. Initially first three months PTA was more effective than exercise rehabilitation but after six months the researcher found that the exercise was more effective than PTA and cost effective also. The study concluded that exercise rehabilitation for claudification treatment has national implication for future PVD care.

Jian (2012) conducted a study to find out the effectiveness of Buerger's Allen Exercise among PVD patients. The study was conducted among 13 patients. The study revealed that the increased angle pressure and toe pressure during the exercise. The

overall benefits are seen in 7 patients after 24 hours. The study concluded that the Buerger's Allen exercise is effective for improving the lower extremity circulation.

A comparative study was conducted by Adam et al. (2011), to determine high intensity training for Intermittent claudication in vascular rehabilitation. The aim of the observational study was investigating the safety and effectiveness of the high intensity interval programme for the patient with peripheral vascular disease. This study was conducted among 47 patients. The result shows that the rehabilitation score with participation in the program and more exercise sessions led to greater improvement. More over no adverse event occurred in the study patients. The study suggested patient with PVD can safely tolerate high intensity exercise programme.

Wang (1996) conducted an experimental study to find out the influence of foot perfusion in diabetes exercise. The study was conducted among 61 patients. The result shows that post exercise, toe pressure and toe brachial pressure (TBI) increased in non - diabetic patient. The study concluded that the improvement in the transcutaneous oxygen tension (TcPO2) and decreased transcutaneous carbon dioxide (TcPCO2) level in foot site in diabetes shows changes in cutaneous blood supply. The result suggested that brief exercise results in an improvement as cutaneous perfusion in non critical PVD particularly patient with type II diabetes mellitus patients.

Summary

This chapter dealt with review of literature related to the problem stated. The literature presented here was extracted from 24 primary and 6 secondary sources it has helped the researcher to understand the impacts of the problem under study. It helped the researcher to develop tools, collect, organize and analyze the data.

CHAPTER –III

RESEARCH METHODOLOGY

The methodology of the research study is defined as the way the data is gathered in order to answer the research questions or to analyze the research problem. It enables the researcher to project a blue print of the research undertaken. The research methodology involves a systematic procedure by which the researcher had to start from initial identification of the problem to its conclusion (Polit and Beck, 2012).

The presented study was conducted to assess the effectiveness of Buerger's Allen exercise on improving the lower extremity perfusion among patients with Diabetes Mellitus. This chapter deals with a brief description of different steps undertaken by the researcher for the study, it involves research approach, research design, setting, population, sample and sampling technique, selection of the tool, validity, reliability, pilot study, data collection procedure and plan for the data analysis.

Research Approach

Research approach is the most significant part of any research. According to Polit and Beck (2012), experimental research is an extremely applied form of research and involves finding out how well a programme, product, practice or policy are working. Its goal is to assess or evaluate the success of the same. An experimental research design was chosen to assesses the effectiveness of Buerger's Allen exercise on lower extremity perfusion among patients with Diabetes Mellitus.

Research design

According to Polit and Beck (2012), a research design is the overall plan from addressing a research questions, including specifications for enhancing study's integrity. Quasi experimental research design was used in this study.

O1 - O2

O1 X O2

O1 **-** Pre test level of lower extremity perfusion among patients with Diabetes mellitus

X **-** Buerger's allen exercise

O2 **-**Post test level of lower extremity perfusion among patients with Diabetes mellitus

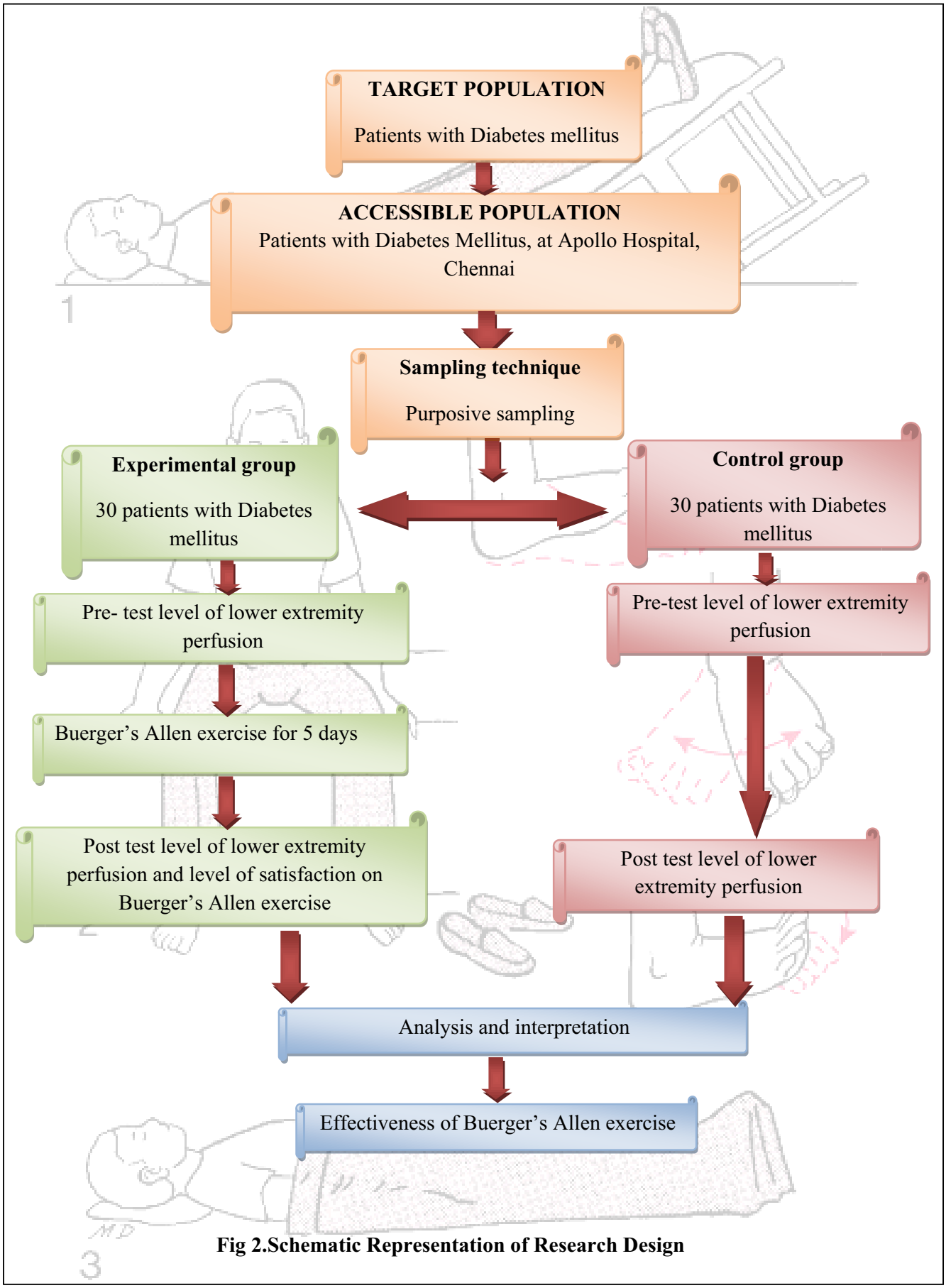

Fig 2.Schematic Representation of Research Design

Variables

An abstract concept that can be measured in a study is called a variable. Variables are characteristics that vary among the subjects being studied.

Independent Variable

The variable that is believed to cause or influence the dependent variable is the independent variable (Polit and Beck 2012).

In this study, the independent variable is Buerger's allen exercise.

Dependent Variable

The variable hypothesized to depend on or to caused by another variable is the dependent variable (Polit and Beck 2012)

In this study dependent variable is lower extremity perfusion.

Attribute Variables

Variables that describe the study sample characteristics are termed as attribute variables (Polit and Beck 2012)

In this study the attribute variables were demographic variables and clinical variables proforma of patients with Diabetes Mellitus patients.

Research Setting

According to Polit and Beck (2012) setting is the physical location and condition in which data collection takes place in the study.

The present study was conducted in Apollo main hospital, Greams road, Chennai for experimental group and Apollo Speciality Hospital, Vanagaram, Chennai for control group. The hospital has developed as a centre of excellence in Cardiac Sciences, Orthopaedics, gastroenterology, Neurosciences, Emergency Care. Along with

excellence, the Apollo philosophy rests on the pillars of technological superiority, a warm patient centric approach, a clear and distinct cost advantage and an edge in forward looking research. This is a 1200 bedded hospital having inpatient and outpatient department with X-ray facilities, ECG, MRI and CT scans, Ultra sonogram and Laboratories services. The setting was chosen because of feasibility in terms of availability of adequate participants and cooperation of the management of Apollo hospitals.

Population

Population is the entire aggregation of cases which meet designated set of criteria (Polit and Beck 2012). The target population is the group of population that the researcher aims to study and to whom the study findings will be generalized.

In this study, the target population comprises of all the patients with Diabetes mellitus who satisfy the inclusion criteria at Apollo hospitals, Chennai.

The **target population** is the group of population that the researcher is aimed to study. In this study target population were patients with Diabetes mellitus.

The **accessible population** in this study were patients with Diabetes mellitus admitted in Apollo Speciality Hospital, Vanagaram, Chennai.

Sample

The sample is the subset of population, selected to participate in a study (Polit and Beck, 2012). A sample of 60 patients with diabetes mellitus were selected for the study, out of which 30 patients are from Apollo main Hospital, Greams road in the experimental group and 30 patients from Apollo speciality Hospital, Vanagaram in the control group.

Sample Size

The sample size for the present study was 30. The sample size was decided based on the feasibility and availability of the sample.

Sampling Technique

Sampling is the process of selecting a portion of the population to represent the entire population (Polit and Beck, 2012). In this study patients were selected by using purposive sampling technique. Available samples were selected during the time of data collection based on inclusion criteria.

Sampling Criteria

Inclusion Criteria

- Both male and female patients with Diabetes mellitus.
- Patients with Diabetes mellitus who were in the age group of 40 to 65 years.
- Patients admitted in medical ward with the diagnosis of Diabetes mellitus.
- Patients who were willing to participate in the study.
- Patients who were available during the period of data collection.
- Patients with Diabetes mellitus and other co morbid disease.
- Patients who understand English.

Exclusion Criteria

- Patients who are not willing to participate.
- Patients with Diabetes mellitus who are critically ill.
- Patients with Diabetes mellitus who practice any other exercises.

Selection and Development of Study Instruments

The study aimed to evaluate the effectiveness of Buerger's Allen exercise on improving the lower extremity perfusion among patients with diabetes mellitus. The data collection instruments were developed through an extensive review of literature in consultation with the opinion of the experts and with the opinion of the faculty members. The instruments used for the study were

- Demographic Variable Proforma
- Clinical Variable Proforma
- Inlow's 60 second diabetic foot screen
- Rating scale on the level of satisfaction of Buerger's Allen exercise.

Demographic Variable Proforma

Demographic variable proforma consist of age, gender, religion, marital status, type of family, education and family income, number of children and duration of stay in Apollo hospital.

Clinical Variable Proforma

Clinical variable proforma includes height, weight, BMI, habit of taking non vegetarian diet, habit of chewing tobacco, habit of smoking, habit of consuming alcohol, nature of physical activity, history of diabetes mellitus, history of taking antidiabetic drugs and history of any other associated disease.

Inlow's 60 second diabetic foot screen

Inlow's 60 second Diabetic foot screen tool is a standardized tool for risk assessment of Diabetes Mellitus patients developed by Murphy C. et al., 2008. It

consists of look for 20 seconds, touch for 10 seconds and assess for 30 seconds. Each criterion is having individual score.

Score interpretation

Score	**Interpretation**
0-6	screening yearly
7-12	screening every 6 months
13-19	screening every 3 months
20-25	screening every month

Rating scale to assess the level of satisfaction on Buerger's Allen Exercise

The rating scale was designed to assess the satisfaction of Buerger's Allen exercise among patients with diabetes mellitus. The data was compiled for data analysis. Obtained data was converted into percentage inferred as follow as:

Score interpretation

Level of satisfaction	**Percentage**
Highly satisfied	>75%
Satisfied	51-75%
Dissatisfied	26-50%
Highly dissatisfied	<25%

Psychometric Properties of the Instruments

Validity

Content validity is the degree to which an instrument measures what it is supposed to measure. Content validity is the sampling adequacy of the content being measured (Polit & Beck , 2012).

The content validity of the tool was obtained by getting opinion from experts in the field of Medicine and Nursing. The validation has suggested some specific modifications in the objectives and rating scale. The modifications and suggestions of experts were incorporated in the final preparation of the tool.

Reliability

Reliability is the degree of consistency with which an instrument measures the attribute it intended to measure (Polit & Beck ,2012).

The reliability of the tool elicited by using split half method. The 'r' found to be 0.83 by using Karl Pearson Correlation Coefficient which shows high positive correlation, indicated that the tool was highly reliable. Satisfaction rating scale on Buerger's Allen exercise was 0.83 by using split half method.

The reliability of instrument was established by test-re-test method among five patients with Diabetes mellitus. The second test was conducted after seven days after the first test to the same group of patients. Reliability was computed using Karl Pearson Correlation Coefficient and it was found to r= 1. The tool was found to be reliable for the study.

Intervention Protocol

The intervention was done from 7am to 12 noon and 1pm to 4pm for 3 patients per day, thus for 10 patients within 2 weeks. Buerger's Allen exercise was given for patients with Diabetes mellitus for 10 min for 2 days to experimental group. Post test was conducted on 4th day of intervention. Informed consent was obtained from the patients only after detailed explanation about the procedure. The lower extremity perfusion was assessed on 1st and 4th day of intervention for both control and experimental group of patients with diabetes mellitus based on Inlow's 60-second Diabetic Foot screening tool.

Patients were asked to lie down and elevate the feet on padded chair or board for ½ to 3 minutes and sit in relaxed position while each foot is flexed and extended then pronated and supinated for 3 minutes. The feet should become entirely pink. If the feets are blue or painful , elevate them and relax as necessary. Patients were asked to lie down quietly for 5 minutes , keeping the legs warm with a blanket. It should be repeated for 5 times. After the intervention on the 4th day post test was conducted for checking whether the lower extremity perfusion has improved or not with the use of blanket and pillow.

Researcher was with the patient throughout the intervention. Inspected for any signs of complications like foot ulcer. Researcher assessed the lower extremity perfusion, which include skin, nails, deformity, temperature, range of motion, sensation, pedal pulses and erythma. After finishing Buerger's Allen exercise, kept the patient in a comfortable position.

Pilot Study

According to Polit & Beck (2012), a pilot study is a miniature or some part of the actual study, in which the instruments are administered to the subjects drawn from the population. It is the small scale version or trail run, done in preparation for the major study. The purpose is to find out the feasibility and practicability of the study design. Pilot study was conducted in Apollo Speciality Hospital,Vanagaram for control group and Apollo main hospital, Greams road for experimental group from 12th December to 23rd December 2014. They were assigned 6 each in experimental and control group. The baseline data of demographic variable and clinical variable was collected before the intervention in both control and experimental group. The lower extremity perfusion was assessed on 1st and 4th day of intervention for both control and experimental group of patients with diabetes mellitus based on Inlow's 60-second Diabetic Foot screening tool.

Buerger's Allen exercise was given for patients with Diabetes mellitus for 10 min for 2 days to experimental group. Post test was conducted at 4th day of intervention. Then the level of satisfaction regarding Buerger's Allen exercise was assessed using the satisfaction scale for experimental group.

Ethical Consideration

1. The study was conducted after obtaining clearance from Ethical committee, Apollo hospitals.
2. The study was conducted after obtaining approval from Principal, Apollo College of Nursing.

3. Consent was obtained from all the participants/bystander before the data collection..
4. Confidentiality was maintained throughout the study.

Data Collection Procedure

Data collection is the precise, systematic gathering of information relevant to the research purpose. The researcher presented the proposal to the ethical committee of Apollo hospitals and got ethical clearance to precede the study.

The investigator collected the data from Apollo main Hospital, Greams road, Chennai and Apollo Speciality Hospital, Vanagaram, Chennai. The observation time schedule was from 7 a.m. – 12 noon and 1 p.m. – 4 p.m. and the data collection period was from December 1st (2014) to January 15th 2015.

Sixty patients with Diabetes mellitus were selected using purposive sampling technique. 30 samples were selected from Apollo Speciality Hospital, Vanagaram for control group and 30 samples from Apollo main Hospital, Greams road for experimental group. The baseline data of demographic variable and clinical variable was collected before the intervention in both control and experimental group. The lower extremity perfusion was assessed before the intervention for both control and experimental group of patients with Diabetes mellitus based on Inlow's 60-second Diabetic Foot Screening Tool.

Buerger's Allen exercise was given for patients with Diabetes Mellitus for 10 min for 5 days to experimental. Post test was conducted at 6th day of intervention. Then the level of satisfaction regarding foot massage was assessed using the satisfaction scale for experimental group.

Problems Faced during Data Collection

The problems faced during the data collection were,

- Difficult to get the cooperation of few patients.
- Few patients were frightened to perform the exercise.

Plan for Data Analysis

Data analysis is the systematic organization, synthesis of research data and testing of null hypothesis by using the obtained data (Polit & Beck, 2012). Analysis and interpretation of the data were carried out using descriptive and inferential statistics.

Descriptive statistics such as mean, frequency and percentage were used to describe the demographic variables, clinical variables and the level of lower extremity perfusion. Inferential statistics such as independent t- test were used to assess the effectiveness of Buerger's Allen exercise on improving the lower extremity perfusion by comparing the pre test and post test mean score. Chi-square test were used to find out the association between selected variables and lower extremity perfusion among patients with Diabetes Mellitus control and experimental.

Summary

This chapter has dealt with the selection of research approach, research design, setting, population, sample, sampling technique, sampling criteria,, selection and development of study instruments, validity and reliability of study instrument, pilot study, data collection procedure and plan for data analysis. The following chapter deals with analysis and interpretation of data using descriptive and inferential statistics.

CHAPTER IV

ANALYSIS AND INTERPRETATION

The data collected from patients with Diabetes mellitus at Apollo Hospitals, Chennai with 30 in the experimental group. The aim was to determine the effectiveness of Buerger's allen exercise. The data were analyzed according to the objectives and hypothesis of the study.

This chapter deals with analysis and interpretation including both descriptive and inferential statistics. Statistics is a field of study concerned with techniques or methods of collection of data, classification, summarizing, interpretation, drawing inference, testing hypothesis, making recommendations (Mahajan, 2004). The data was analyzed, tabulated and interpreted using descriptive and inferential statistics.

Organisation of the Findings

The findings of the study were organized and presented under the following headings:

- Frequency and Percentage Distribution of Demographic Variables among patients with Diabetes mellitus (Table.1)
- Frequency and Percentage Distribution of Clinical Variables among patients with Diabetes mellitus (Table.2)
- Comparison of Mean and Standard Deviation on lower extremity perfusion among patients with Diabetes mellitus in control and experimental group (Table.3)
- Frequency and Percentage Distribution of level of Satisfaction Regarding Buerger's allen exercise (Table.4)

- Association Between The Selected Demographic Variables And Lower Extremity Perfusion among patients with Diabetes Mellitus in control and experimental group (Table.5)
- Association between the Selected Clinical Variables And Lower Extremity Perfusion among patients With Diabetes Mellitus in control and experimental group (Table.6)

Table. 1

Frequency and Percentage Distribution of Demographic Variables among patients with Diabetes mellitus (N=30)

Demographic variables	CONTROL		EXPERIMENTAL	
	f	%	f	%
Religion				
Hindu	20	66.7	26	86.7
Muslim	3	10.0	-	-
Christian	7	23.3	4	13.3
Type of the family				
Nuclear	27	90.0	27	90.0
Joint	3	10.0	3	10.0
Marital status				
Unmarried	27	90.0	3	10.0
Married	3	10.0	27	90.0
Monthly income				
RS. 6001-RS. 10000	5	16.7	1	3.3
more than Rs.10000	25	83.3	29	96.7
Number of children				
No	4	13.3	4	13.3
One	5	16.7	12	40.0
Two	19	63.3	14	46.7

The data in table 1 revealed that most of the patients with diabetes mellitus were males (53.3%, 70.0%), duration of stay in hospital was 4-6 days (56.7%, 60.0%,), and they had two children (63.3%, 46.7%,). Majority of them were Hindus by religion (66.7%, 86.7%), were from nuclear family (90.0%, 90.0%), and with monthly income of > Rs.10,000 (83.3%, 96.75) and 10% and

90% of the patients were married in control and experimental group respectively.

Fig. 3 revealed that significant percentage of the patients were in the age group of more than 41 years (43.3%).

Fig. 4 depicts that most of patients with diabetes mellitus were males (70%)

Fig .5 shows that most of the patients with Diabetes patients were graduates (70%)

Fig . 6 reveals that the duration of stay in hospital is more in 4-6 days (60%)

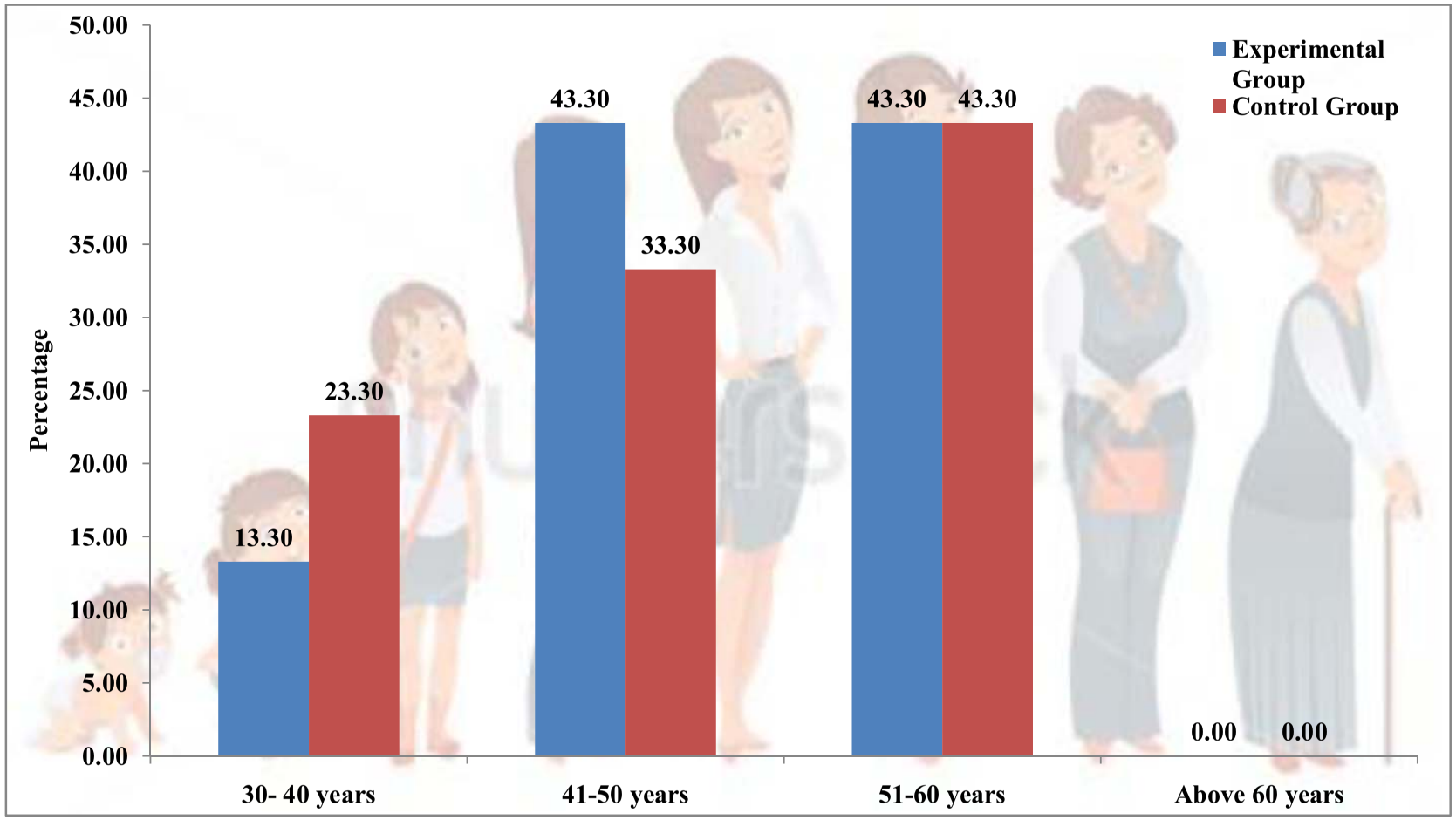

Fig.3 Percentage distribution of Age of patients with Diabetes Mellitus

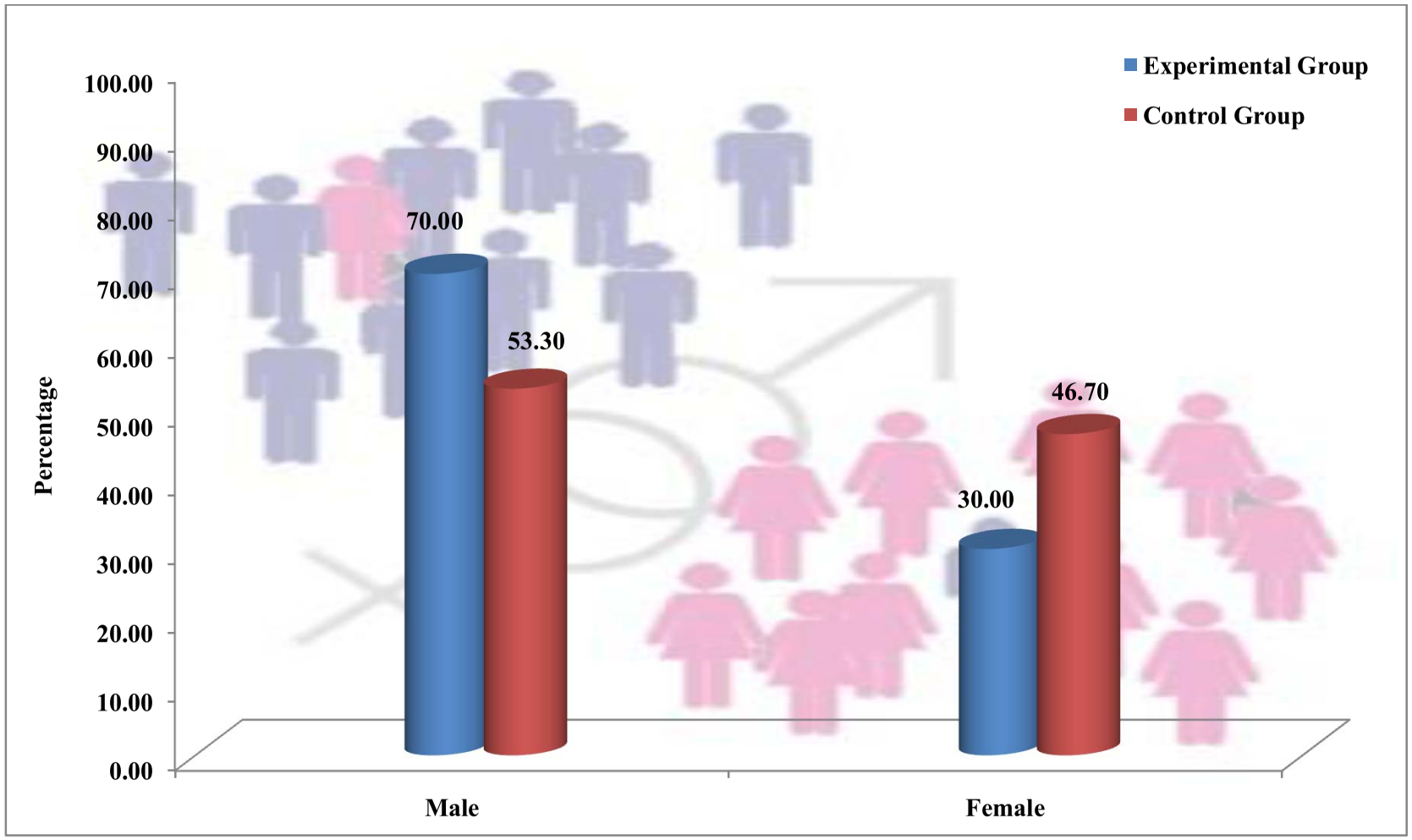

Fig.4 Percentage distribution of Gender among patients with Diabetes Mellitus

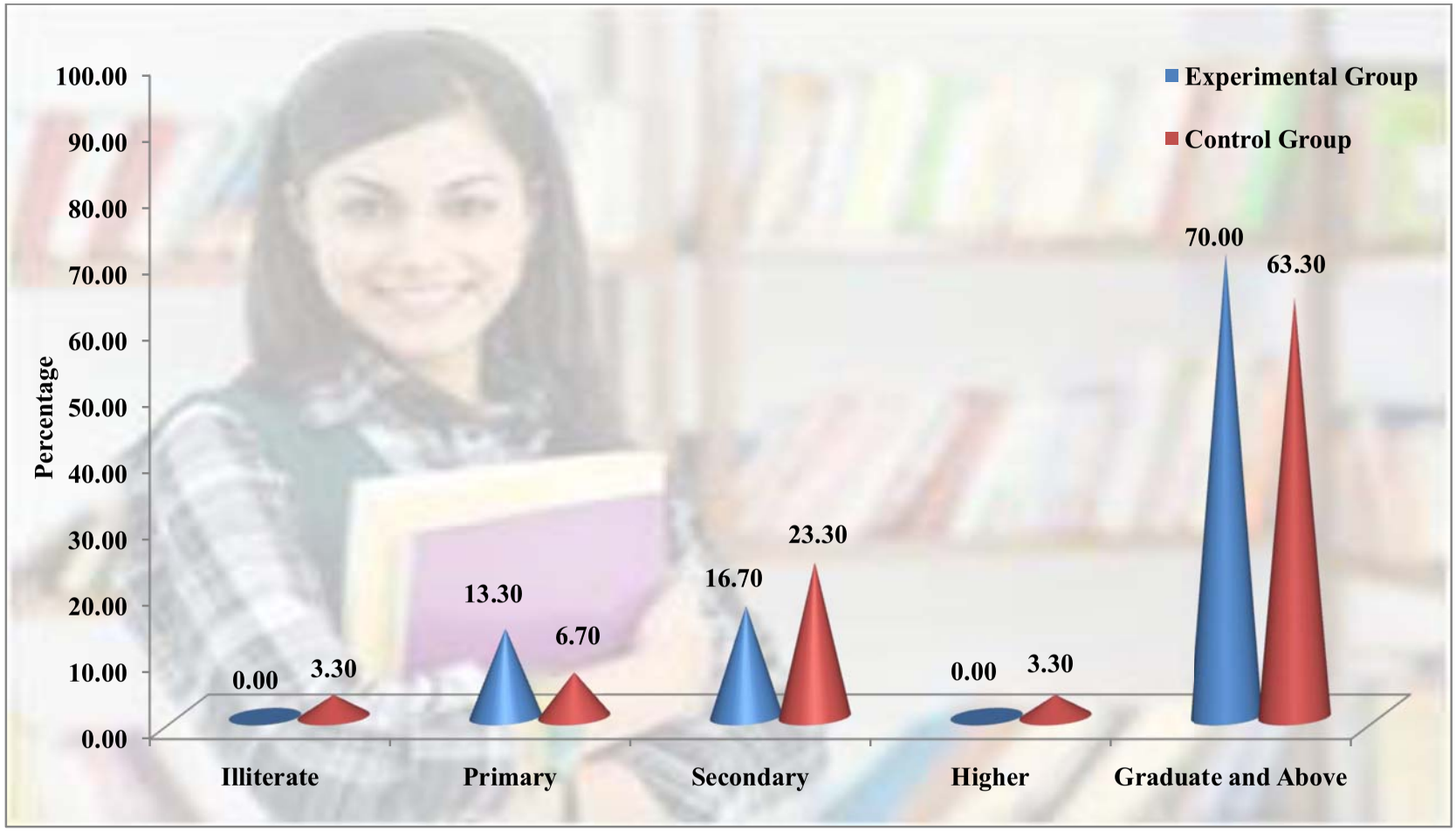

Fig.5 Percentage Distribution of Educational Status among patients with Diabetes Mellitus

Fig.6 Percentage Distribution of duration of stay in the hospital among patients with Diabetes Mellitus

Table 2

Frequency and Percentage Distribution of Clinical Variables among patients with Diabetes Mellitus (N=30)

Clinical variable	Control group		Experimental group	
	f	%	f	%
Body mass index				
18-24	17	56.7	17	56.7
25-29	13	43.3	13	43.3
History of taking non vegetarian diet				
Yes	27	90.0	27	90.0
No	3	10.0	3	10.0
If yes ,how many times do you take non vegetarian diet				
Once in a week	7	23.3	3	10.0
Twice in a week	10	33.3	16	53.3
Thrice in a week	10	33.3	6	20.0
Occasionally	3	10.0	5	16.7
Habit of chewing tobacco				
Yes	-	-	-	-
No	30	100.0	30	100.0
Duration of chewing tobacco				
Nil	30	10.0%	30	10.0%
Habit of smoking				
Yes	21	70.0	16	53.3
No	9	30.0	14	46.7
Duration of smoking				
Nil	9	30.0	14	46.7
1- 5 years	10	33.3	9	30.0
6-10 years	11	36.7	7	23.3

Duration of consuming alcohol				
Nil	9	30.0	14	46.7
1- 5 years	10	33.3	9	30.0
6-10 years	11	36.7	7	23.3
History of Diabetes mellitus				
1- 5 years	20	66.7	23	76.7
6-10 years	10	33.3	7	23.3
History of taking anti-diabetic drugs				
Yes	-	-	-	-
No	30	100.0	30	100.0
History of any associated disease				
No	10	33.3	9	30.0
Heart disease	20	66.7	21	70.0
Use of non pharmacological treatment for diabetes				
Yes	-	-	-	-
No	30	100.0	30	100.0

From table 2 it shows that most of the patients with diabetes mellitus were smokers (70.0%, 53.3%), had habit of consuming alcohol (70.0%, 56.7%) and were known to have heart disease (66.7%, 56.7%). Around half of the patients with diabetes mellitus had body mass index (BMI) of 25-29 (43.3%, 43.3%), were taking non vegetarian diet twice in a week (33.3%, 53.3%) and sedentary workers (73.3%, 46.7%). Significant percentage of patients had family history of Diabetes mellitus from parents (30%, 43.3%) in control and experimental group respectively. None of them had non

pharmacological treatment, comorbid disease and the history of chewing tobacco (100%,100%).

Fig. 7 reveals that most of the patients were consumed alcohol (70%)

Fig. 8 depicts that less than half of the diabetes mellitus patients had family history in grandparents (43.30%)

Fig. 9 shows that more than half of the patients nature of physical activity was sedentary (53.3%)

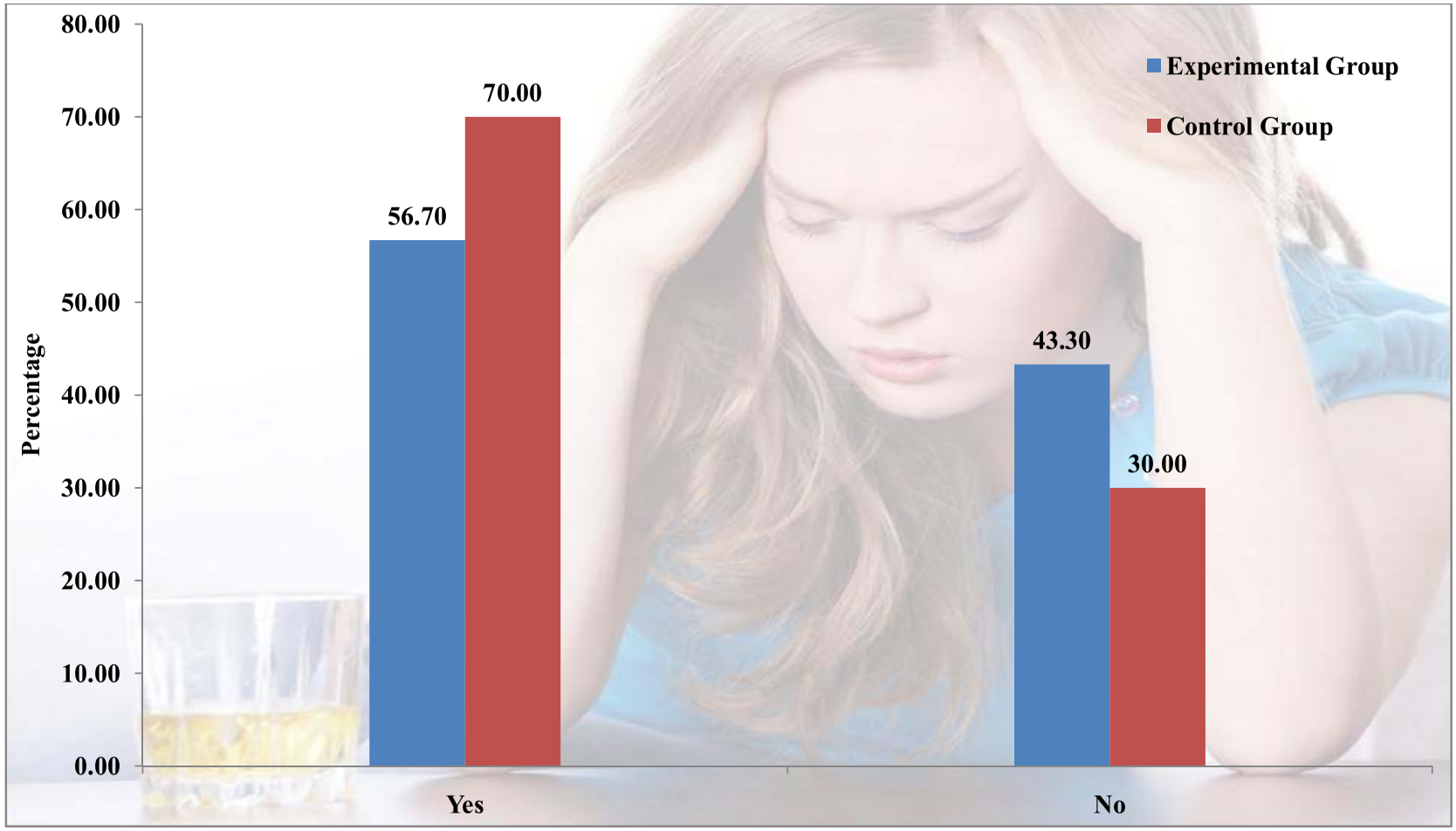

Fig.7 Percentage Distribution of history of Consuming alcohol among patients with Diabetes Mellitus

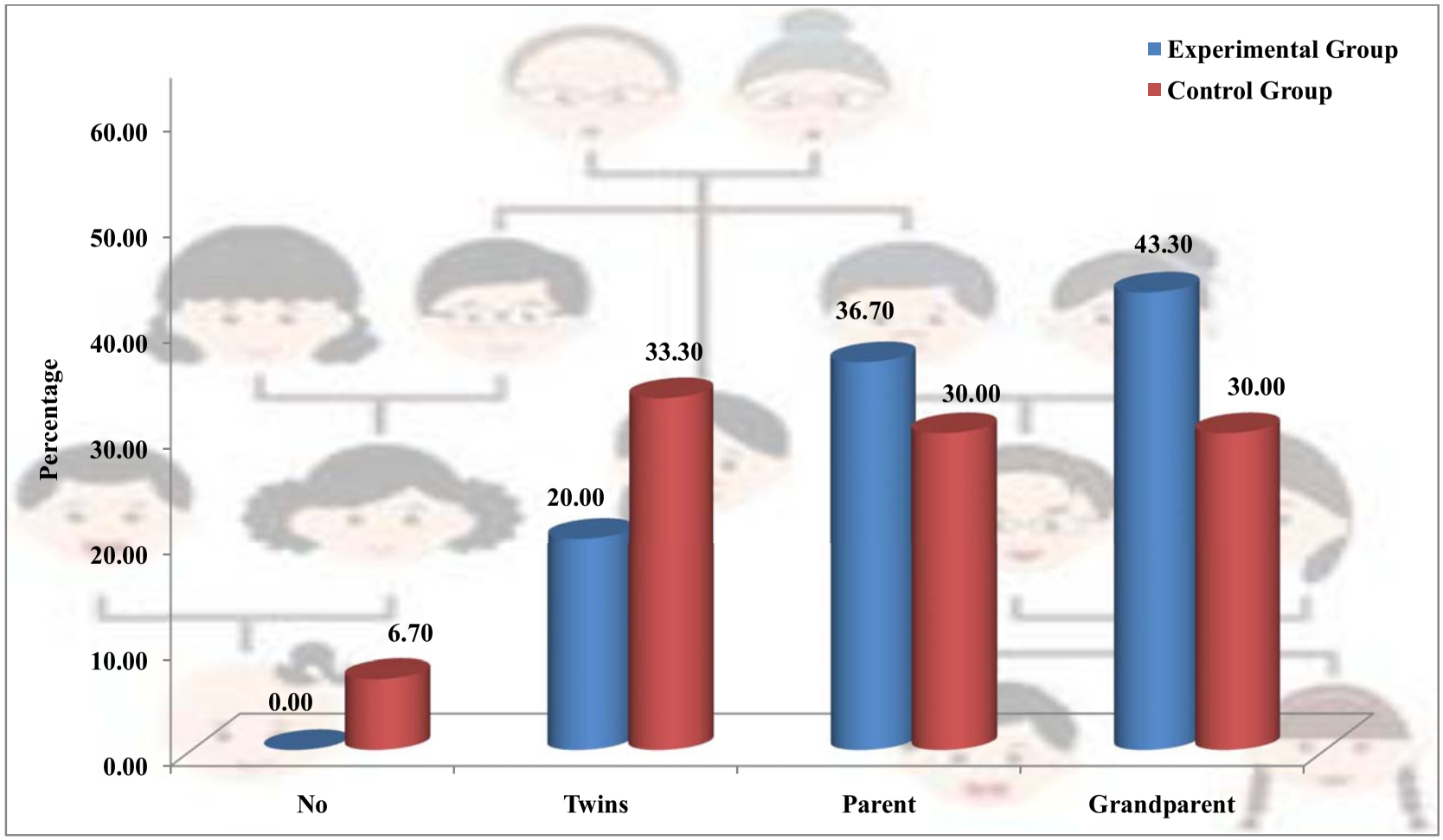

Fig.8 Percentage Distribution of Family History of Diabetes Mellitus

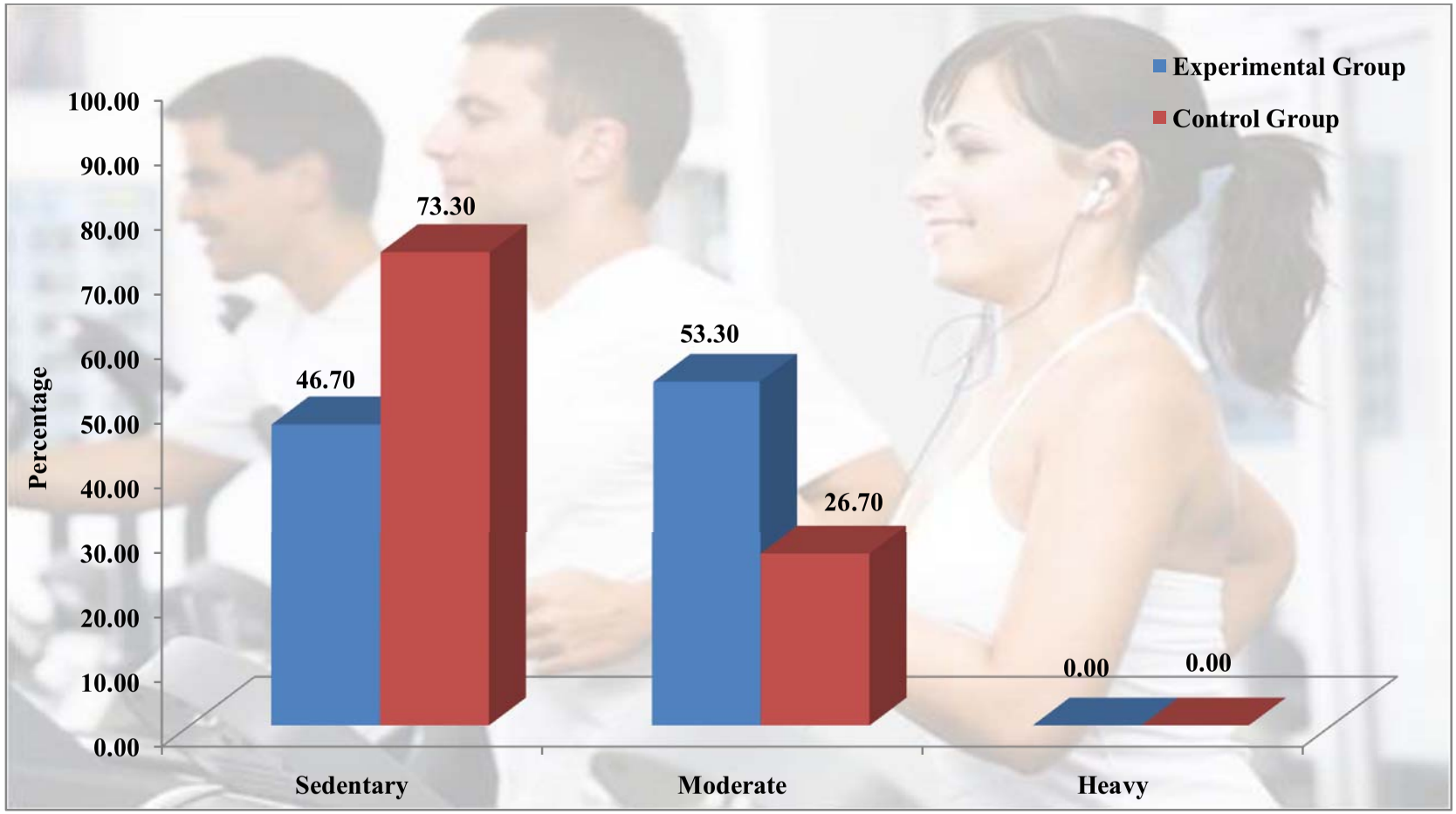

Fig.9 Percentage distribution of nature of physical activity among patients with Diabetes mellitus

Table 3

Comparison of mean and standard deviation of lower extremity perfusion among patients with Diabetes mellitus in control and experimental group

(N=30)

Group	Pre test			Post test		
	M	**SD**	**'t' value**	**M**	**SD**	**'t' value**
Control group	21.6	3.71	1.01	20.5	3.192	**16.24*** **
Experimental group	21	2.41		7.83	2.913	

***P<0.001**

Data from table. 3 shows that , there was no significant difference in the mean perfusion scores of pre test (M=21.6, S.D=3.71) in the control group and (M=21,S.D=2.41) in the experimental group at $p > 0.005$, where as there was significant difference in mean perfusion scores of post test (M=20.5, S.D =3.192) in control group and (M=7.83, S.D=2.913) in experimental group at $p < 0.001$. Significant difference in the lower extremity perfusion score before and after the Buerger's Allen exercise were identified in Diabetes mellitus patients with 't' value of 16.24 at $p <0.001$ level. Hence null hypothesis ''H_{O1} There will be no significant difference between the lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after administration of Buerger's Allen exercise.'' was rejected

Table 4

Frequency and Percentage Distribution of Level of Satisfaction regarding Buerger's Allen Exercise in experimental group

(n=30)

Level of satisfaction	f	%
Satisfied	8	26.7
Highly satisfied	22	73.3
Dissatisfied	-	-
Highly dissatisfied	-	-

It can be inferred from the table 4 that majority of the patients (73.3%) were highly satisfied with the Buerger's Allen exercise.

Table 5

Association Between the Selected Demographic Variables and Lower Extremity Perfusion among Patients with Diabetes Mellitus in control and experimental group (N=30)

Demographic variables	Control group			Experimental group		
	Upto mean	Above mean	χ^2	Upto mean	Above mean	χ^2
Age						
30 -40 years	3	4	0.22	2	2	0.519
41 - 50 years	5	5	df=2	5	8	df=2
51 -60 years	7	6		4	9	
Gender						
Male	7	9	0.536	8	13	0.062
Female	8	6	df =1	3	6	df =1
Religion						
Hindu	9	11	0.676	8	18	2.921
Muslim	2	1	df=1	-	-	df =1
Christian	4	3		3	1	
Others	-	2		1	3	
Duration of stay in the hospital						
2- 3 days	6	7	0.136	-	-	0.215
4-6 days	9	8	df=1	6	12	df=1
>6 days	-	-		5	7	

The data from table 5, it could be inferred that there was no significant association between selected demographic variables and the lower extremity perfusion among patients with Diabetes Mellitus in control and experimental group. Hence null

hypothesis H_O3''There will be no significant association between the demographic variables-age, gender, religion, duration of stay and lower extremity perfusion in control and experimental group of patients with diabetes mellitus before and after Buerger's Allen exercise.'' was retained.

Table 6

Association Between the Selected Clinical Variables and Lower Extremity Perfusion among patients with Diabetes Mellitus in control and experimental group (N=30)

Clinical variables	Control group			Experimental group		
	Upto mean	Above mean	χ^2	Upto mean	Above mean	χ^2
Body mass index						
18-24	12	5	**6.652***	4	8	1.292
25-29	3	10	df =1	7	11	df=1
Duration of chewing tobacco						
Nil	15	15	-	11	19	-
Habit of smoking						
Yes	10	11	0.159	7	9	0.741
No	5	4	df=1	4	10	df=1
Habit of consuming alcohol						
Yes	10	11	0.159 df=1	8	9	1.824 df=1
No	5	4		3	10	
Nature of physical activity						
Sedentary	11	11	-	6	8	0.433
Moderate	4	4		5	11	df=1
History of diabetes						
1- 5 years	10	10	-	10	13	1.969
6-10 years	5	5		1	6	df=1

***p<0.05**

Note: Categories under the variables were clubbed for the sake of chi-square analysis. The data from table 6, shows that there was a significant association between the selected clinical variable of Body Mass Index (χ^2 =6.652*, df=1) , (χ^2 =1.292, df = 1) and lower extremity perfusion in patients with Diabetes Mellitus at p< 0.05 in control group and experimental group respectively. Hence null hypothesis H_O4 ''There will be no significant association between the clinical variables and the lower extremity perfusion in control and experimental group of patients with diabetes mellitus before and after administration of Buerger's Allen exercise'' with regard to body mass index, was rejected.

Other clinical variables had no significant association with lower extremity perfusion in patients with Diabetes mellitus in control and experimental group. Hence null hypothesis H_O4 with regard to the clinical variables like habit of taking non vegetarian diet, habit of chewing tobacco, habit of smoking, nature of physical activity, history of Diabetes mellitus, i.e., H_O4 ''There will be no significant association between the clinical variables and the lower extremity perfusion in control and experimental group of patients with diabetes mellitus before and after administration of Buerger's Allen'' was partially retained.

Summary

This chapter dealt with analysis and interpretation of the data obtained by researcher. The analysis showed that Buerger's Allen exercise has improved lower extremity perfusion of Demographic variables, Clinical variables of patients with Diabetes mellitus and compared with pre test and post test. The patients were highly satisfied with Buerger's Allen exercise.

CHAPTER-V

DISCUSSION

A Quasi Experimental Study to Assess the Effectiveness of Buerger's Allen exercise on Improving the Lower Extremity Perfusion among Patients with Diabetes Mellitus admitted at Apollo hospitals, Chennai.

Objectives of the Study

1. To assess the lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after Buerger's Allen exercise.
2. To evaluate the effectiveness of Buerger's Allen exercise by comparing lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after Buerger's Allen exercise.
3. To determine the level of satisfaction among patients with diabetes mellitus patients regarding Buerger`s Allen exercise.
4. To find out the association between the selected demographic variables and the lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after Buerger's Allen exercise.
5. To find out the association between the selected clinical variables and the lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after Buerger's Allen exercise.

This study was carried out upon the 60 Diabetes mellitus patients at selected Apollo hospitals, Chennai. Buerger's Allen exercise was given for the experimental group for 5 days continuously and post test level of lower extremity perfusion was checked on 6th day of the therapy in both control and experimental group. Then the

level of satisfaction on Buerger's Allen exercise among patients with diabetes mellitus in the experimental group was assessed by using Inlow's rating scale.

The discussion was presented under the following headings

The findings of the study were organized and presented under the following headings:

- Frequency and Percentage Distribution of Demographic Variables among patients with Diabetes mellitus
- Frequency and Percentage Distribution of Clinical Variables among patients with Diabetes mellitus
- Comparison of Mean and Standard Deviation of lower extremity perfusion among patients with Diabetes mellitus in control and experimental group
- Frequency and Percentage Distribution of level of Satisfaction among Diabetes Mellitus patients Regarding Buerger's Allen exercise
- Association Between The Selected Demographic Variables and Lower Extremity Perfusion among patients with Diabetes Mellitus in control and experimental group
- Association between the Selected Clinical Variables and Lower Extremity Perfusion among patients With Diabetes Mellitus in control and experimental group

Frequency and Percentage Distribution of Demographic Variables among patients with Diabetes mellitus

In this present study, most of the patients with diabetes mellitus were males (53.3%, 70.0%), duration of stay in hospital was 4-6 days (56.7%, 60.0%,), and they had two children (63.3%, 46.7%,). Majority of them were Hindus by religion (66.7%,

86.7%), were from nuclear family (90.0%, 90.0%), and with monthly income of > Rs.10,000 (83.3%, 96.75) in control and experimental group respectively.

Most of the patients with diabetes mellitus were male (53.3%,70.0%). This was consistent with the study done by Fitchett G 1999 which was found that, the rate for males began to increase at a faster rate than that of females. From 1980 to 2011, the age-adjusted rate of diagnosed diabetes mellitus increased 156% (from 2.7% to 6.9%) for males and 103% (from 2.9% to 5.9%) for females.

The study findings revealed that a significant percentage of the Diabetes mellitus patients were 41-50 years of age (43.3%, 33.3%) both in control and experimental group. This findings was supported with the research done by Davis JA(2011), the rate of diagnosed diabetes among people aged 65–74 (21.8%) was more than 13 times that of people younger than 45 years of age (1.6%).

Frequency and Percentage Distribution of Clinical Variables among Patients with Diabetes Mellitus

In this present study, most of the patients with diabetes mellitus were smokers (70.0%, 53.3%), had habit of consuming alcohol (70.0%, 56.7%) and were known to have heart disease (66.7%, 56.7%). Around half of the patients with diabetes mellitus had body mass index (BMI) of 25-29 (43.3%, 43.3%), were taking non vegetarian diet twice in a week (33.3%, 53.3%) and sedentary workers (73.3%, 46.7 in control and experimental group respectively.

Majority of the patients with diabetes mellitus had habit of consuming alcohol (56.7%,70.0%). This was relevant with the study conducted by Tomas Andersson (2004) which concluded that high alcohol consumption (≥20 g/day) was associated with an increased incidence of type II diabetes mellitus.

Majority of the patients diabetes mellitus were smokers (70.0%,53.3%,). The association between smoking and Type II diabetes mellitus are likely to reflect behavioural changes secondary to illness or medical counselling. The study findings were supported by the research conducted by Wallaschofski H (2005), the high proportion of current smokers among Type II diabetes mellitus patients, particularly men, should be monitored in repeated surveys following the introduction of disease management programmes.

It could be inferred that most of the patients with diabetes mellitus had B.M.I. of 25-29 (43.3%, 43.3%). Increased BMI was associated with increased prevalence of diabetes mellitus. An increase in body fat is generally associated with increased risk of metabolic diseases such as type II diabetes mellitus.

Comparing the Mean and Standard Deviation of Lower Extremity Perfusion among Patients with Diabetes Mellitus

In the present study, there was no significant difference in the mean perfusion scores of pre test (M=21.6, S.D=3.71) in the control group and (M=21,S.D=2.41) in the experimental group at $p > 0.005$, where as there was significant difference in mean perfusion scores of post test (M=20.5, S.D =3.192) in control group and (M=7.83, S.D=2.913) in experimental group at $p < 0.001$. Significant difference in the lower extremity perfusion score before and after the Buerger's Allen exercise were identified in patients with Diabetes mellitus with 't' value of 16.24 at $p <0.001$ level. Hence null hypothesis ''H_{O1} There will be no significant difference between the lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after administration of Buerger's Allen exercise.'' was rejected

The above results showed that Buerger's Allen exercise helps to improve lower extremity perfusion among patients with Diabetes mellitus. It reduces stress,

promotes relaxation and enhances comfort. Thus the researcher concluded that the findings must be disseminated so that evidence based knowledge can be utilized in the clinical setting to improve lower extremity perfusion through Buerger's Allen exercise and it also aids the nursing personnel to concentrate more on alternative and complementary therapy along with anti-diabetic therapy , by which we can prevent complications.

Frequency and Percentage Distribution of Level of Satisfaction among Patients with Diabetes mellitus regarding Buerger's Allen exercise

When assessing the level of satisfaction of patients regarding Buerger's Allen exercise, it was noted that majority of them were highly satisfied (73.3 %). This interprets that Buerger's Allen exercise is highly effective in improving lower extremity perfusion. Though there are various methods to reduce Diabetes mellitus, it is simple and effective method.

Association Between the Selected Demographic Variables and Lower Extremity Perfusion among Patients with Diabetes Mellitus in control and experimental group

Chi square test was used to find out the association between demographic and the lower extremity perfusion. There was no significant association between selected demographic variables and the lower extremity perfusion were noticed in patients with Diabetes Mellitus in control and experimental group. Hence null hypothesis'' H_O3 There will be no significant association between the demographic variables and lower extremity perfusion in control and experimental group of patients with diabetes mellitus before and after administration of Buerger's Allen exercise.'' was retained.

Association Between the Selected Clinical Variables and Lower Extremity Perfusion among Patients with Diabetes Mellitus

There was a significant association between the selected clinical variable of Body Mass Index (χ^2 =6.652*, df=1), (χ^2 =1.292, df = 1) and lower extremity perfusion in patients with Diabetes Mellitus at p< 0.05 in control group and experimental group respectively. Hence null hypothesis ''H_O4 There will be no significant association between the clinical variables and the lower extremity perfusion in control and experimental group of patients with diabetes mellitus before and after administration of Buerger's Allen exercise'' with regard to body mass index, was rejected.

However, other clinical variables had no significant association with lower extremity perfusion in patients with Diabetes mellitus in control and experimental group. Hence null hypothesis H_O4 with regard to the clinical variables like habit of taking non vegetarian diet, habit of chewing tobacco, habit of smoking, nature of physical activity, history of Diabetes mellitus, i.e., H_O4 ''There will be no significant association between the clinical variables and the lower extremity perfusion in control and experimental group of patients with diabetes mellitus before and after administration of Buerger's Allen'' was partially retained.

This findings was supported by Rodolfo Valdez (2004), regarding the factors associated with Diabetes mellitus patients and found that there is a significant association between body mass index, duration of smoking and consuming alcohol.

Summary

This chapter has dealt with the objectives of the study, major findings of the demographic and clinical variables among patients with diabetes mellitus, comparison of mean and standard deviation of lower extremity perfusion among patients with diabetes mellitus, assessment of the level of satisfaction on Buerger's allen exercise, association between the selected demographic and clinical variables and lower extremity perfusion among patients with Diabetes mellitus in control and experimental group.

CHAPTER-VI

SUMMARY, CONCLUSION, IMPLICATIONS AND RECOMMENDATIONS SUMMARY

The heart of the research project lies in reporting the findings. This is the most creative and demonstrating part of the study. This chapter deals with the summary of the study findings, conclusion, implications and recommendations for the future researchers.

A Quasi Experimental Study to Assess the Effectiveness of Buerger's Allen exercise on Improving the Lower Extremity Perfusion among patients with Diabetes Mellitus admitted at Apollo hospitals, Chennai.

Objectives of the Study

1. To assess the lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after Buerger's Allen exercise.
2. To evaluate the effectiveness of Buerger's Allen exercise by comparing lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after Buerger's Allen exercise.
3. To determine the level of satisfaction among patients with Diabetes Mellitus regarding the Buerger`s Allen exercise.
4. To find out the association between the selected demographic variables and the lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after Buerger's Allen exercise.
5. To find out the association between the selected clinical variables and the lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after Buerger's Allen exercise.

Null Hypotheses

H_O1 There will be no significant difference between the lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after Buerger's Allen exercise.

H_O2 There will be no significant association between the effectiveness of Buerger's Allen exercise by comparing lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after Buerger's Allen exercise.

H_O3 There will be no significant association between the demographic variables and the lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after Buerger's Allen exercise.

H_O4 There will be no significant association between the clinical variables and the lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after Buerger's Allen exercise.

The conceptual frame work for this study is based on Sister callista Roy Adaptation Model. An extensive review literature and guidance by the experts formed foundations to the development of the tool. A Quasi experimental research approach was used to achieve the objectives of the study.

The investigator used the Demographic variable proforma, Clinical variable proforma, Inlows 60 second Diabetic foot screening tool to assess the lower extremity perfusion, and rating scale for the level of satisfaction of Buerger's Allen exercise to collect the data. The data collection tools were validated and reliability was established. After the pilot study, the data for the main study was collected. The collected data was tabulated and analyzed using descriptive and inferential statistics.

Major Findings of the Study

Frequency and Percentage Distribution of Demographic Variables among patients with Diabetes mellitus

In this study most of the patients with diabetes mellitus were males (53.3%, 70.0%), duration of stay in hospital was 4-6 days (56.7%, 60.0%,), and they had two children (63.3%, 46.7%,). Majority of them were Hindus by religion (66.7%, 86.7%), were from nuclear family (90.0%, 90.0%), and with monthly income of > Rs.10,000 (83.3%, 96.75) and 10% and 90% of the patients were married in control and experimental group respectively.

Frequency and Percentage Distribution of Clinical Variables among patients with Diabetes mellitus

In this study Most of the patients with diabetes mellitus were smokers (70.0%, 53.3%), had habit of consuming alcohol (70.0%, 56.7%) and were known to have heart disease (66.7%, 56.7%). Around half of the patients with diabetes mellitus had body mass index (BMI) of 25-29 (43.3%, 43.3%), were taking non vegetarian diet twice in a week (33.3%, 53.3%) and sedentary workers (73.3%, 46.7%). Significant percentage of patients had family history of Diabetes mellitus from parents (30%, 43.3%) in control and experimental group respectively. None of them had non pharmacological treatment, comorbid disease and the history of chewing tobacco (100%,100%).

Comparison of Mean and Standard Deviation of Lower Extremity Perfusion among Patients with Diabetes mellitus in control and experimental group

The findings of the study revealed that, there was no significant difference in the mean perfusion scores of pre test (M=21.6, S.D=3.71) in the control group and

(M=21,S.D=2.41) in the experimental group at p > 0.005, where as there was significant difference in mean perfusion scores of post test (M=20.5, S.D =3.192) in control group and (M=7.83, S.D=2.913) in experimental group at p < 0.001. Significant difference in the lower extremity perfusion score before and after the Buerger's Allen exercise were identified in patients with Diabetes mellitus with 't' value of 16.24 at p <0.001 level. Hence null hypothesis ''H_{O1} There will be no significant difference between the lower extremity perfusion in control and experimental group among patients with diabetes mellitus before and after administration of Buerger's Allen exercise.'' was rejected

Frequency and Percentage Distribution of level of Satisfaction among Diabetes Mellitus patients Regarding Buerger's Allen exercise

In this study all the patients were highly satisfied (73.3%) with the administration of Buerger's Allen exercise.

Association Between the Selected Demographic Variables and Lower Extremity Perfusion with Diabetes Mellitus Patients in control and experimental group

Chi square test was used to find out the association between demographic and the lower extremity perfusion. There was no significant association between selected demographic variables and the lower extremity perfusion were noticed in patients with Diabetes Mellitus in control and experimental group. Hence null hypothesis'' H_O3 There will be no significant association between the demographic variables and lower extremity perfusion in control and experimental group of patients with diabetes mellitus before and after administration of Buerger's Allen exercise.'' was retained.

Association Between the Selected Clinical Variables and Lower Extremity Perfusion among Patients with Diabetes Mellitus

Significant association between the selected clinical variable of Body Mass Index (χ^2 =6.652*, df=1) , (χ^2 =1.292, df = 1) and lower extremity perfusion in patients with Diabetes Mellitus at p< 0.05 in control group and experimental group respectively. Hence null hypothesis ‘’H_O4 There will be no significant association between the clinical variables and the lower extremity perfusion in control and experimental group of patients with diabetes mellitus before and after administration of Buerger’s Allen exercise’’ with regard to body mass index, was rejected.

However, other clinical variables had no significant association with lower extremity perfusion in patients with Diabetes mellitus in control and experimental group. Hence null hypothesis H_O4 with regard to the clinical variables like habit of taking non vegetarian diet, habit of chewing tobacco, habit of smoking, nature of physical activity, history of Diabetes mellitus, i.e., H_O4 ‘’There will be no significant association between the clinical variables and the lower extremity perfusion in control and experimental group of patients with diabetes mellitus before and after administration of Buerger’s Allen‘’ was partially retained.

Conclusion

Diabetes mellitus is an ‘’complex matabolic’’ disease. A non pharmacological natural healing approach is needed to overcome that problem. Buerger’s allen exercise is simple, which is easy to do, has no notable side effects and most acceptable one to reduce Diabetes mellitus. The findings of the study showed that the post level of lower extremity perfusion on Buerger’s allen exercise was statistically significant at P<0.05 in the experimental group. Hence it could be concluded that there will bean association between Diabetes mellitus and Buerger’s allen exercise.

Implications

The researcher has derived from the study, the following implications which are of vital concern in the field of nursing practice, nursing education, nursing administration and nursing research.

Nursing Practice

Nurses should follow protocol for assessing the lower extremity perfusion as routine assessment just like physical assessment and initiate measures to improve the lower extremity perfusion among patients with Diabetes mellitus. The nurse has a vital role in educating the patients about the various practices that can improve their health and develop the safe and healthy habits to prevent complications and the delay in the discharge of patients from the hospital.

The nurse should educate the patients about Buerger's Allen exercise and its impact on the improvement of lower extremity perfusion. We need to incorporate evidence based practice in managing patients with Diabetes Mellitus. In addition, the nurse as a team leader can plan, organize and coordinate activities for the patients, so that the incidence of complications due to Diabetes mellitus, hospital stay can be reduced.

Nursing Education

The nurse educators should involve in teaching the students about various exercises that helps patient in clinical setting. Nurses should have knowledge about the factors, which enhance and increase the lower extremity perfusion. Nurses can be educated about the various techniques, which have multiple effects on lower extremity perfusion. Integration of theory and practice is a vital need and it is important in nursing education.

There are various exercises for patients with Diabetes Mellitus that can be included in theory as well as in the clinical practice. Nurses should be taught about the assessment of lower extremity perfusion by using Inlow's 60 second Diabetic foot screen. Nurse educators should initiate protocol for assessing the lower extremity perfusion as routine assessment just as physical assessment and it should stress to the staff nurses and student nurses and must be recorded in their nursing notes. The learning experience should include different strategies to teach lower extremitu perfusion. The importance of health education needs to be stressed.

Nursing Administration

Considering today's technological advances and the ever growing challenges of the health care needs, the administrators have the highest responsibility in providing opportunity for the nurses to use different modes of therapy in improving lower extremity perfusion. This will enable the nurses to update their knowledge and to acquire special skills in managing the patients who have chronic Diabetes mellitus.

Nurse administrator should take adequate steps with the growing bodies in formulating policies and protocols in providing patient education and plans for manpower, money, material and methods and also should find time to conduct successful and useful patient education programmes. Nurse administrator should provide opportunity for the nurses to attend the various training programmes.

Nursing Research

There is a need for extensive and intensive research in this area. It opens a big avenue for research on innovative, cost effective and other alternative methods of teaching materials for educating the patients. The professionals should conduct further research, and student nurses should conduct further studies on the impact of various

alternative methods in treating the patients with Diabetes Mellitus. This will generate more scientific base. Dissemination of the findings can be done through conferences, seminars, publications in professional, national and international journals and through World Wide Web. More research needs to be conducted with the use of locally available resources in improving lower extremity perfusion. More theories can be generated based on the research findings.

Recommendations

The researcher recommends the following studies

- The same study can be conducted on larger samples for better generalization.
- The similar study could be replicated in different settings
- A comparative study could be conducted to evaluate the effectiveness of Buerger's allen exercise with other non pharmacological agents and alternative therapies.
- The similar study can be conducted to assess the effectiveness of Buerger's allen exercise in different age groups
- A study can be conducted on the quality of life among Diabetes mellitus patients.

Limitations

- Study findings cannot be generalized due to small sample size.
- True experimental study could not be conducted due to practical difficulty.
- Random sampling could not be done because sampling frame was not possible.

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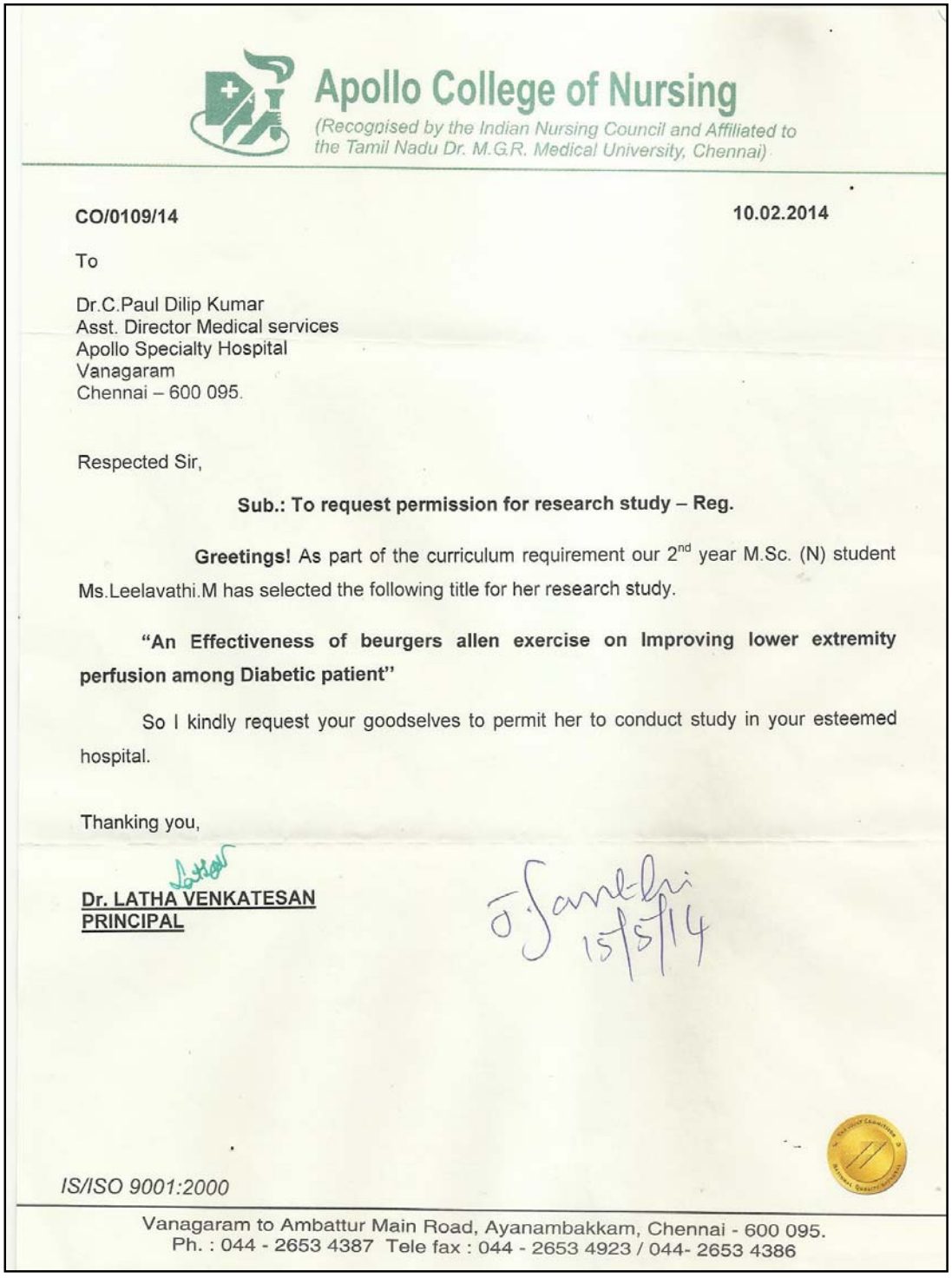
APPENDIX - I

LETTER SEEKING PERMISSION TO CONDUCT THE STUDY



Apollo College of Nursing

(Recognised by the Indian Nursing Council and Affiliated to the Tamil Nadu Dr. M.G.R. Medical University, Chennai)

CO/0109/14 **10.02.2014**

To

Dr.C.Paul Dilip Kumar
Asst. Director Medical services
Apollo Specialty Hospital
Vanagaram
Chennai – 600 095.

Respected Sir,

Sub.: To request permission for research study – Reg.

Greetings! As part of the curriculum requirement our 2nd year M.Sc. (N) student Ms.Leelavathi.M has selected the following title for her research study.

"An Effectiveness of beurgers allen exercise on Improving lower extremity perfusion among Diabetic patient"

So I kindly request your goodselves to permit her to conduct study in your esteemed hospital.

Thanking you,

Dr. LATHA VENKATESAN
PRINCIPAL

15/5/14

IS/ISO 9001:2000

Vanagaram to Ambattur Main Road, Ayanambakkam, Chennai - 600 095.
Ph. : 044 - 2653 4387 Tele fax : 044 - 2653 4923 / 044- 2653 4386

LETTER SEEKING PERMISSION TO CONDUCT THE STUDY

Apollo College of Nursing
(Recognised by the Indian Nursing Council and Affiliated to the Tamil Nadu Dr. M.G.R. Medical University, Chennai)

CO/0107/14 **10.02.2014**

To

Dr.Radha Rajagopalan
Director of Medical Education
Apollo Main Hospitals
Greams Road
Chennai- 600 006.

Respected Madam,

Sub.: To request permission for research study – Reg.

Greetings! As part of the curriculum requirement our 2nd year M.Sc. (N) student Ms.Leelavathi.M has selected the following title for her research study.

"An Effectiveness of beurgers allen exercise on Improving lower extremity perfusion among Diabetic patient"

So I kindly request your goodselves to permit her to conduct study in your esteemed hospital.

Thanking you,

Dr. LATHA VENKATESAN
PRINCIPAL

IS/ISO 9001:2000

Vanagaram to Ambattur Main Road, Ayanambakkam, Chennai - 600 095.
Ph. : 044 - 2653 4387 Tele fax : 044 - 2653 4923 / 044- 2653 4386

LETTER SEEKING PERMISSION TO CONDUCT THE STUDY

Dr. RADHA RAJAGOPALAN, MBBS., AB(Paed).,
DIRECTOR - MEDICAL EDUCATION
APOLLO HOSPITALS CHENNAI
RECOGNISED BY MEDICAL COUNCIL OF INDIA
NATIONAL BOARD OF EXAMINATIONS (NBE)

Apollo HOSPITALS
TOUCHING LIVES

May 2, 2014

Dear Dr. Venkatraman,

As part of the second year MSc., Nursing Curriculum Requirement, students have to do project work as part of their research study.

Ms. Leelavathi has selected the following title for her research study: **An Effectiveness of beurgers allen exercise on improving lower extremity perfusion among diabetic patient.**

Kindly help her to complete the study.

With regards

DR. RADHA RAJAGOPALAN
DIRECTOR MEDICAL EDUCATION

Forwarded Dr. Venkatraman DMC

Dr. R.K. VENKATASALAM
Asst. Director Medical Services
Apollo Hospitals, Chennai - 600006.

To meet Dr Venkatraman (Diabetologist)

Apollo Hospitals, 21, Greams Lane, Off Greams Road, Chennai 600 006, India T : +91 44 2829 0200, 3333
Fax : +91 44 2829 4429 Grams: "APOLLO HOSP" Telex : 41-6419 AHEL IN, Regd. Office : Bishop Garden, Chennai - 600 028.
E : enquiry@apollohospitals.com Website : www.apollohospitals.com

APPENDIX - II

ETHICS COMMITTEE CERTIFICATE

Ethics Committee

09 April, 2014

To,
Ms. Leelavathi,
2nd Year M.SC (Nursing),
Department of Medical Surgical Nursing,
Apollo College of Nursing, Chennai.

Ref: An experimental study to assess the effectiveness of Beurgers Allen exercise on the lower extremity perfusion among diabetic patients, at selected hospitals Chennai

Sub: Approval of the above referenced project and its related documents.

Dear Ms. Leelavathi,

Ethics Committee-Apollo Hospitals has received the following document submitted by you related to the conduct of the above-referenced study.

- Project Proposal
- Informed Consent Form

The Ethics Committee-Apollo Hospitals reviewed and discussed the Project proposal documents submitted by you related to the conduct of the above referenced Project at its meeting held on 08 April, 2014.
The following Ethics Committee Members were present at the meeting held on 08 April, 2014

Name	Gender	Designation	Affiliation	Position in the committee
Dr. P. Nalini Rao	F	Independent Consultant, Social Research and development	Madras School of Social Work, Chennai	Chairperson (Social Scientist)
Dr. Rema Menon	F	Blood Bank Officer	Apollo Hospitals, Chennai	Member Secretary (Clinician)
Dr.Muralidaran	M	Professor & Head, Department of Pharmacology	BaidMetha College of Pharmacy, Chennai	EC-Member (Pharmacologist)
Mrs. Mathanghi	F	Executive- project	Apollo Pharmacy, Chennai	EC-Member (Layperson)
Mr. Philip.T.Paul	M	Lawyer	Madras High Court, Chennai	EC-Member (Lawyer)

Apollo Hospitals Enterprise Limited
21, Greams Lane, Off Greams Road, Chennai - 600 006

Ethics Committee

Apollo HOSPITALS
TOUCHING LIVES

Dr. K. Sathyamurthi	M	Asst. Professor	School of Social work, Chennai	EC-Member (Social Scientist)
Dr. VijayaKumar Chockan	M	Medical Superintendant	Apollo Speciality Hospitals, Chennai	EC-Member (Clinician)
Dr. K. C. Krishnakumar	M	Medical Superintendant	Apollo First Med Hospitals, Chennai	EC-Member (Clinician)

After due ethical and scientific consideration, the Ethics Committee has approved the above presentation submitted by you.

The EC review and approval of the report is only to meet the academic requirement and will not amount to any approval of the conclusions / recommendations as conclusive, deserving adoption and implementation, in any form, in any healthcare institution.

The Ethics Committee is constituted and works as per ICH-GCP, ICMR and revised Schedule Y guidelines.

With Regards,

Date: 09/04/14

Rema Menon

Dr. Rema Menon,
Ethics Committee-Member Secretary,
Apollo Hospitals, Chennai,
Tamil Nadu, India.

Dr. REMA MENON
MEMBER
ETHICS COMMITTEE
APOLLO HOSPITALS
CHENNAI-600 006, TAMILNADU

Apollo Hospitals Enterprise Limited
21, Greams Lane, Off Greams Road, Chennai - 600 006
Tel : 91 - 44 - 2829 1618, 2829 3333, 91 - 44 - 2829 5465 Extn : 5045 / 6641
Fax : 91 - 44 - 2829 1618 / 4449 E - Mail : ecapollochennai@gmail.com

APPENDIX - III

LETTER SEEKING PERMISSION FOR CONTENT VALIDITY

From

Ms.Leelavathi.M
M.Sc. (Nursing) Second Year,
Apollo College of Nursing,
Chennai – 600 095.

To

Forwarded Through:
Dr. LathaVenkatesan,
Principal,
Apollo College of Nursing.

Sub: Requesting for opinions and suggestions of experts for establishing content validity for research tool.

Respected Madam,

I am a postgraduate student of the Apollo College of Nursing. I have selected the below mentioned topic for research project to be submitted to The Tamil Nadu Dr. M.G.R Medical University, Chennai as a partial fulfillment of Masters of Nursing Degree.

TITLE OF THE TOPIC:

A Quasi Experimental Study to Assess the Effectiveness of Buerger's Allen exercise on Improving the Lower Extremity Perfusion among Patients with Diabetes Mellitus admitted at Apollo hospitals, Chennai.

With regards may I kindly request you to validate my tool for its appropriateness and relevancy. I am enclosing the Background, Need for the study, Statement of the problem, Objectives of the study, Demographic Variable Proforma, Clinical Variable Proforma, Observation Schedule on Pulmonary Parameters and Satisfaction Rating Scale for Patients with Balloon Therapy. I would be highly obliged and remain thankful for your great help if you could validate and send it as soon as possible.

Thanking you,

Date: **Yours sincerely,**

Place: **Leelavathi.M**

APPENDIX - IV

LIST OF EXPERTS

1. **Dr. LathaVenkatesan, M.Sc (N), M.Phil. (N)., Ph.D.(N)., M.B.A,**
   Principal and Professor in Maternity Nursing,
   Apollo College of Nursing,
   Chennai- 600 095
2. **Dr. Venkataraman.S, M.B.B.S., MD.,**
   Senior Consultant Diabetologist,
   Apollo Main Hospital, Greams road,
   Chennai – 600095.
3. **Dr. Akila Mani, MRCP.,MRCGP.,D.Diab.,**
   Consultant General Medicine,
   Apollo Speciality Hospital, Vanagaram,
   Chennai-600 095.
4. **Prof. Lizy Sonia. A, M.Sc.(N).,**
   Vice Principal and Professor in Medical Surgical Nursing,
   Apollo College of Nursing,
   Chennai-600 095.
5. **Prof. K. Vijayalakshmi, M.Sc.(N).,M.B.A.,**
   Professor in Psychiatric Nursing,
   Apollo College of Nursing,
   Chennai- 600 095.
6. **Mrs. Nesa Sathya Satchi, M.Sc.(N).,**
   Professor in Pediatric Nursing,
   Apollo College of Nursing,
   Chennai- 600 095.
7. **Mr.Ashok.B, M.Sc, M.phil,**
   Assistant professor
   Department of community medicine
   M.A.T.I.M.S.
   Chennai-600 095.
8. **Mrs. Kanchana.G, M.Sc. (N), M.Sc (Psy).,**
   Reader in Medical Surgical Nursing,
   Apollo College of Nursing,
   Chennai-600 095.

APPENDIX - V

CERTIFICATE FOR CONTENT VALIDITY

TO WHOMSOEVER IT MAY CONCERN

This is to certify that tools and content for the research study developed by II year M.Sc (Nursing) student of Apollo College of Nursing for her dissertation "A Quasi Experimental Study to Assess the Effectiveness of Buerger's Allen exercise on Improving the Lower Extremity Perfusion among Patients with Diabetes Mellitus admitted at Apollo hospitals, Chennai'' was validated.

Signature of the Expert

Name and Designation

APPENDIX - VI

LETTER SEEKING CONSENT FROM PARTICIPANTS

Dear participant/ bystander,

I am Leelavathi.M. M.Sc. Nursing student of Apollo College of Nursing, Chennai. As a part of my study, a research on **"Effectiveness of Buerger's Allen exercise on Improving the Lower Extremity Perfusion among Patients with Diabetes Mellitus admitted at Apollo hospitals, Chennai.".**

I hereby seek your consent and co-operation to participate in the study. Please be frank and honest in response. The information obtained will be kept confidential and anonymity will be maintained.

Signature of the researcher

I ……..Hereby consent to participate my relative in this study

Place:

Date: Signature of the participant/ bystander

APPENDIX - VII

CERTIFICATE FOR ENGLISH EDITING

TO WHOMSOEVER IT MAY CONCERN

This is to certify that dissertation entitled **" A Quasi Experimental Study To Assess The Effectiveness Of Buerger's Allen Exercise On Improving The Lower Extremity Perfusion Among Patients With Diabetes Mellitus Admitted At Apollo Hospitals ,Chennai "** by Ms. Leelavathi.M, M.Sc (N) II yr student, Apollo College of Nursing, was edited for English language appropriateness.

D. Amirtha Joycelin

D. AMIRTHA JOYCELIN
PG ASSISTANT (ENGLISH)
GHSS KALKULAM

APPENDIX - VIII

PLAGIARISM ORIGINALITY REPORT

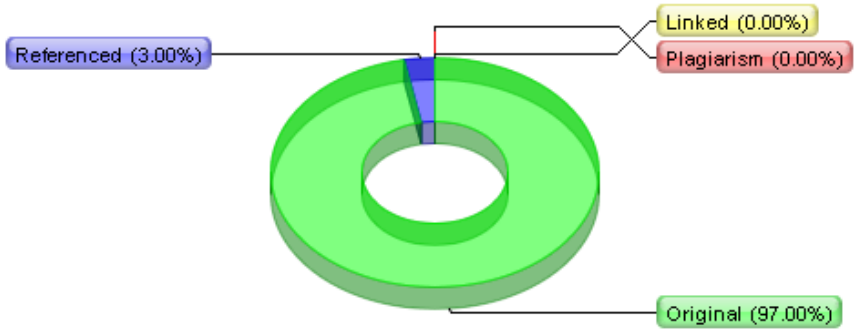
	Plagiarism Detector - Originality Report
	Plagiarism Detector Project: [http://plagiarism-detector.com] Application core version:850

Originality report details:

Generation Time and Date:	12/07/2015
Document Name:	M. LEELAVATHI THESIS-1.docx
Document Location:	D:\my research\ LEELAVATHI THESIS-1.docx
Document Words Count:	17,900
Check time [hs:ms:ss]:	00:00:45

Important Hint: to understand what exactly is meant by any report value - you can click . It will navigate you to the most detailed explanation at our web site.

Plagiarism Detection Chart:



Referenced 3% / Linked 0%

Original - 97% / 0% - Plagiarism

APPENDIX - IX

DEMOGRAPHIC VARIABLE PROFORMA

Purpose

This proforma is used to measure the demographic variables of the Diabetic Mellitus patients such as age in years ,gender ,religion ,educational status ,type of the family , monthly income ,source of income ,number of children and duration of stay in the hospital etc.

Instruction

The researcher collects the following information from the participants and records by asking questions in the interview form and observation. Please be frank and free in answering, it will be kept confidential and anonymity will be maintained.

Identification data:

Sample no:

1.Age in years

1.1 30-40 years ☐

1.2 40-50 years ☐

1.3 50-60 years ☐

1.4 >60 years ☐

2.Gender

2.1 Male ☐

2.2 Female ☐

3.Religion

3.1 Hindu ☐

3.2 Muslim ☐

3.3 Christian ☐

3.4 Others (specify) ☐

4.Educational status

4.1 Illiterate ☐

4.2 Primary education ☐

4.3 Secondary education ☐

4.4 Higher education ☐

4.5 Graduate and above ☐

5. Type of the family

5.1 Nuclear ☐

5.2 Joint ☐

5.3 Extended family ☐

6. Marital status

6.1 Unmarried ☐

6.2 Married ☐

6.3 Separated /divorced ☐

6.4 Widow/widower ☐

7. Monthly income

7.1 Nil ☐

7.2 <Rs.2000 ☐

7.3 Rs.2001-6000 ☐

7.4 Rs.6001-10000 ☐

7.5 >Rs.10000 ☐

8. Source of income

8.1 Pensioners ☐

8.2 Govt. aid ☐

8.3 Property ☐

8.4 Savings ☐

8.5 Others (specify) ☐

9. Number of children

9.1 No ☐

9.2 One ☐

9.3 Two ☐

9.4 More than two ☐

10. Duration of stay in the hospital

10.1 Less than 1 day ☐

10.2 2-3 days ☐

10.3 4-6 days ☐

10.4 >6 days ☐

APPENDIX- X

CLINICAL VARIABLE PROFORMA

Purpose

This proforma is used to assess the risk factors of lower extremity perfusion among Diabetic Mellitus patients.

Instructions

The researcher collects the following information from the participants and records by asking questions in the interview form and observation. Please be frank and free in answering, it will be kept confidential and anonymity will be maintained.

1. Height ----cms

2. Weight--------Kgs

3. Body mass index (Kg/m2)

3.1 <25 ☐

3.2 25-29 ☐

3.3 30-34 ☐

3.4 35-39 ☐

4. Habit of taking non vegetarian diet

4.1 Yes ☐

4.2 No ☐

4.a. If yes, how many times do you take non-vegetarian food

4.1 Once in a week ☐

4.2 Twice in a week ☐

4.3 Thrice in a week ☐

4.4 Occasionally ☐

5. Habit of chewing tobacco

5.1 Yes ☐

5.2 No ☐

5.a. If yes, duration of chewing tobacco

5.1 <1 year ☐

5.2 1-5 years ☐

5.3 6-10 years ☐

5.4 >10 years ☐

6. Habit of smoking

6.1 Yes ☐

6.2 No ☐

6.a. If yes duration of smoking

6.1 <1 year ☐

6.2 1-5 years ☐

6.3 6-10 years ☐

6.4 >10 years ☐

7. Habit of consuming alcohol

7.1 Yes ☐

7.2 No ☐

7.a. If yes, duration of consuming alcohol

7.1 < 1 year ☐

7.2 1-5 years ☐

7.3 6-10 years ☐

7.4 >10 years ☐

8. Nature of physical activity

8.1 Sedentary ☐

8.2 Moderate ☐

8.3 Heavy ☐

9. History of Diabetic mellitus

9.1 < 1 year ☐

9.2 1-5 years ☐

9.3 6-10 years ☐

9.4 >10 years ☐

10. **Family history of Diabetic mellitus**

10.1 No ☐

10.2 Twin /sibling ☐

10.3 Parent ☐

10.4 Grandparent ☐

11. History of taking anti-diabetic drugs

11.1 No ☐

11.2 Regularly ☐

11.3 Occasionally ☐

11.4 Only during discomfort ☐

12. History of any other associated disease

12.1 No ☐

12.2 Diabetes ☐

12.3 Kidney disease ☐

12.4 Heart disease ☐

12.5 Others ☐

13. Use of nonpharmacological treatment for diabetes

13.1 Yes (specify) ☐

13.2 No ☐

APPENDIX - XI

INLOW'S SCREENING TOOL

60 – second Diabetic Foot screen

S.No	Look – 20 Seconds	Left Foot	Right Foot	Care Recommendations
1.	**Skin** 0 – Intact and healthy 1 – dry with fungus or light callus 2 – heavy callus build up 3 – open ulceration or history of previous ulcer			
2.	**Nails** 0 – Well kept 1 – unkempt and ragged 2 – thick, damaged or infected			
3.	**Deformity** 0 – no diformity 2 – mild deformity 4 – major deformity			
4.	**Footwear** 0 – appropriate 1 – inappropriate 2 – causing trauma			
	Touch 10 sec			
5.	**Temperature – cold** 0 – footwarm 1 – foot is cold			

6.	**Temperature – Hot** 0 – foot is warm 1 – foot is hot			
7.	**Range of Motion** 0 – full range of hallux 1 – hallux limitus 2 – hallux rigidus 3 – hallux amputation			
	Assess – 30 Seconds			
8.	Sensation – Monfilament Testing 0 – 10 sites detected 2 – 7-9 sites detected 4 – 0-6 sites detected			
9.	Sensation – Ask 4 questions i) Are your feet ever numb? ii) Do they ever tingle? iii) Do they ever burn? iv) Do they ever feel like insects are crawling on them? 0 – no to all questions 2 – yes to any of the questions			
10.	Pedal pulses 0 – Present 1 – absent			
11.	Dependent Rubor			

	0 – No 1 – yes			
12.	Erythema 0 – No 1 – Yes			
	Score Totals =			

Screening for foot ulcers and / or limb – threatening, complications. use the highest score from left or right foot.

Score = 0-6 recommend screening yearly

score = 7-12 recommend screening every 6 months

score = 13-19 recommend screening evey 3 months

Score = 20-25 recommend screening every 1-3 months

APPENDIX - XII

BLUE PRINT ON RATING SCALE ON SATISFACTION OF BUERGER'S ALLEN EXERCISE UPON DIABETES MELLITUS

S.No	CONTENT	ITEM NUMBER	ITEMS	PERCENTAGE
1	Characteristics of Researcher	1,2,3,4	4	33.3%
2	Method of Administration	5,6,7	3	25%
3	Effectiveness of Buerger's allen Exercise	8,9,10,11,12	5	41.7%

APPENDIX - XIII

RATING SCALE ON LEVEL OF SATISFACTION ON

BUERGER'S ALLEN EXERCISE

Purpose

This rating scale is designed to assess the level of satisfaction among Diabetes mellitus patients regarding Buerger's Allen exercise. This is developed by the investigative to assess the satisfaction of the Buerger's Allen exercise among patient with Diabetes mellitus. This is a 4 point rating scale ranging from 4-1 (highly satisfied, satisfied, dissatisfied and highly dissatisfied)

Instructions

There are 12 items below. Kindly read the items. Response extends from highly satisfied, satisfied, dissatisfied and highly dissatisfied. Put (√) mark against your answers. Describe your responses freely and frankly. The responses will be kept confidential and used for research purpose only.

Sl. NO	ITEMS	HIGHLY SATISFIED 4	SATISFIED 3	DISSATISFIED 2	HIGHLY DISSATISFIED 1
1.	Explanation of the procedure of foot massage				
2.	Easy to understand the method of instruction				
3.	Approachable				
4.	Way of performing the Procedure				
5.	Frequency of Buerger's Allen exercise				

6.	Duration of administration of Buerger's Allen exercise				
7.	Was the Buerger's Allen exercise given at appropriate time				
8.	Use of Buerger's Allen exercise in improving lower extremity perfusion				
9.	Cost effectiveness				
10.	Best method of non – pharmacological intervention for improving lower extremity perfusion				
11.	No side effects				
12.	Promotes relaxation				

Scoring interpretation

Level of satisfaction		**Score**
Highly satisfied	:	4
Satisfied	:	3
Dissatisfied	:	2
Highly dissatisfied	:	1

APPENDIX - XIV

DATA CODE SHEET

Age in years	**AG**	**Body Mass Index**	**BMI**
30-40 years	1	<24	1
40-50 years	2	24-29	2
50-60 years	3	30-34	3
4 >60 years	4	35-39	4
Gender	**GR**	**Habit of taking non vegetarian diet**	**HNV**
Male	1	yes	1
Female	2	no	2
Religion	**RL**	**Habit of chewing tobacco**	**HCT**
Hindu	1	yes	1
Muslim	2	no	2
Christian	3	**Habit of Smoking**	**HOS**
Others (specify)	4	yes	1
Educational status	**ES**	no	2
Illiterate	1	**Habit of consuming alcohol**	**HCA**
Primary education	2	yes	1
Secondary education	3	no	2
Higher education	4	**Nature of physical activity**	**NPA**
Graduate and above	5	sedentary	1
Type of the family	**TOF**	moderate	2
Nuclear	1	Heavy	3
Joint	2	**History of Diabetes mellitus**	**HDM**
Extended family	3	< 1 year	1
Marital status	**MS**	1-5 years	2
Unmarried	1	6-10 years	3
Married	2	>10 years	4
Separated /divorced	3	**Family history of Diabetes mellitus**	**FHDM**
Widow/widower	4	no	1
Monthly income	**MI**	regularly	2
Nil	1	occasionally	3
<Rs.2000	2	Only during discomfort	4
Rs.2001-6000	3	**History of any other associated diasease**	**HAD**
Rs.6001-10000	4		
>Rs.10000	5	no	1

Source of income	**SOI**
Pensioners	1
Govt. aid	2
Property	3
Savings	4
Others (specify)	5
Number of children	**NOC**
No	1
One	2
Two	3
More than two	4
Duration of stay in the hospital	**DOSH**
Less than 1 day	1
2-3 days	2
4-6 days	3
>6 days	4
diabetes	2
Kidney disease	3
Heart disease	4
others	5
Use of non pharmacological trearment for diabetes	**UNPD**
Yes	1
no	2

APPENDIX - XV

MASTER CODING SHEET

Experimental Group

Demographic variables										Clinical variables																		Inlow's screening tool		Level of satisfaction
sl.no	age	gender	religion	edu stat	type fam	marsts	month inc	num chil	d.o.s.h.	height	weight	b.m.i	h.n.v	h.m.n.v.	h.o.c.t	d.o.c.t.	h.o.s	d.o.s	h.o.c.a.	d.o.c.a.	n.p.a	h.o.d.m.	f.h.d.m	h.t.add	h.o.ad	u.n.p.d.	s.o.i	Pre test	Post test	post test satisfaction
1	3	1	1	5	1	2	5	2	3	2	2	3	1	2	2	1	1	2	1	2	2	2	2	1	1	2	4	22	4	45
2	2	2	1	5	1	2	5	3	3	2	3	2	1	1	2	1	2	1	2	1	2	3	2	1	1	2	4	25	6	36
3	2	2	1	5	1	2	5	2	4	4	3	2	1	4	2	1	1	2	1	2	2	3	3	1	3	2	4	22	11	48
4	2	2	3	3	2	2	4	2	3	4	2	3	2	3	2	1	1	3	1	3	2	2	4	1	3	2	3	19	12	42
5	3	1	1	3	1	2	5	3	3	3	2	2	2	3	2	1	1	3	1	3	1	2	4	1	3	2	3	24	4	43
6	3	1	1	3	1	2	5	2	4	3	3	3	1	4	2	1	2	1	2	1	1	2	4	1	1	2	3	25	6	41
7	3	1	1	2	1	2	5	2	4	3	2	3	1	3	2	1	2	1	2	1	2	2	3	1	1	2	3	25	10	45
8	1	1	1	5	1	1	5	1	4	4	2	4	1	2	2	1	1	3	1	3	2	2	4	1	1	2	4	21	11	38
9	1	2	1	5	1	2	5	3	4	3	3	3	1	2	2	1	1	3	1	3	1	2	4	1	3	2	4	19	4	42
10	2	2	1	5	1	2	5	3	4	3	3	3	2	3	2	1	2	1	2	1	1	2	3	1	3	2	4	22	6	36
11	2	2	1	5	1	2	5	3	3	3	2	2	1	3	2	1	1	2	1	2	1	3	3	1	3	2	4	24	8	35
12	2	1	1	5	1	2	5	3	3	3	3	3	1	2	2	1	1	2	1	2	1	2	4	1	3	2	4	22	5	32
13	3	1	3	5	1	2	5	3	3	3	2	3	1	4	2	1	2	1	2	1	2	2	4	1	3	2	3	22	11	36
14	1	1	1	2	1	1	5	1	3	3	3	2	1	2	2	1	2	1	2	1	2	3	4	1	1	2	3	25	11	41
15	1	2	1	5	1	1	5	1	3	4	2	3	1	2	2	1	2	1	2	1	2	3	3	1	1	2	4	22	9	45
16	3	2	3	5	1	2	5	2	3	4	2	3	1	2	2	1	2	1	2	1	2	2	4	1	3	2	4	18	12	33
17	3	2	1	5	1	2	5	2	3	3	2	3	1	4	2	1	1	2	1	2	2	2	4	1	3	2	4	23	5	32
18	3	1	1	5	1	2	5	3	3	3	3	2	1	2	2	1	1	2	1	2	2	2	3	1	3	2	4	22	9	43
19	2	1	1	3	2	2	5	3	3	3	2	2	1	2	2	1	2	1	2	1	1	2	4	1	3	2	4	22	8	42
20	2	1	3	5	1	2	5	2	4	3	3	2	1	2	2	1	1	3	1	3	2	3	3	1	3	2	4	19	4	38
21	3	1	1	5	1	2	5	2	4	3	3	2	1	2	2	1	1	3	1	3	2	2	3	1	3	2	4	20	9	44
22	3	1	1	5	1	2	5	3	4	3	3	3	1	2	2	1	2	1	2	1	1	2	2	1	3	2	4	25	10	48
23	2	1	1	2	1	2	5	3	3	4	3	3	1	4	2	1	2	1	2	1	1	2	2	1	1	2	3	18	4	48
24	2	1	1	2	1	2	5	3	3	3	2	2	1	2	2	1	2	1	2	1	1	2	2	1	1	2	3	23	12	35
25	2	1	1	5	1	2	5	3	4	3	3	4	1	2	2	1	1	2	1	2	1	2	3	1	3	2	4	18	6	47
26	3	1	1	5	1	2	5	1	4	3	2	4	1	2	2	1	1	2	1	2	2	3	4	1	3	2	4	24	10	32
27	2	1	1	3	2	2	5	2	4	4	2	3	1	2	2	1	1	2	1	2	2	2	2	1	3	2	4	22	3	33
28	3	1	1	5	1	2	5	2	3	3	3	3	1	1	2	1	2	1	2	1	1	2	3	1	3	2	3	19	6	35
29	2	1	1	5	1	2	5	2	3	2	3	2	1	1	2	1	1	3	1	3	1	2	3	1	3	2	4	18	10	40
30	3	1	1	5	1	2	5	3	3	2	3	2	1	3	2	1	2	1	1	1	1	2	4	1	3	2	4	19	9	35

MASTER CODING SHEET

Control group

Demographic variables										Clinical variables																		Inlow's screening tool	
sl.no	age	gender	religion	edu stat	type fam	mar sts	month inc	num chil	d.o.s.h.	height	weight	b.m.i	h.n.v	h.m.n.v.	h.o.c.t	d.o.c.t.	h.o.s.	d.o.s.	h.o.c.a.	d.o.c.a.	n.p.a.	h.o.d.m.	f.h.d.m.	h.t.add	h.o.ad	u.n.p.d.	s.o.i	Pre test	Post test
31	2	1	3	5	1	1	5	2	2	2	2	2	1	4	2	1	1	2	1	2	1	3	2	1	3	2	3	19	22
32	3	2	1	5	1	1	5	2	2	3	3	3	1	3	2	1	2	1	2	1	2	2	3	1	1	2	2	22	23
33	3	1	1	5	1	1	5	3	3	3	2	2	2	3	2	1	2	1	2	1	1	3	3	1	1	2	4	21	25
34	2	1	1	2	1	1	4	3	3	2	2	3	2	2	2	1	2	1	2	1	1	3	3	1	1	2	3	22	24
35	1	1	1	1	1	1	4	3	2	3	2	3	1	2	2	1	1	2	1	2	1	2	4	1	3	2	3	22	22
36	1	2	3	5	1	1	5	1	3	3	3	3	1	3	2	1	1	2	1	2	1	3	1	1	3	2	4	22	22
37	1	2	2	5	2	2	5	2	3	4	3	2	1	2	2	1	1	3	1	3	1	2	1	1	3	2	4	19	19
38	2	1	2	5	1	1	5	3	3	3	3	2	1	3	2	1	1	3	1	3	1	2	3	1	3	2	4	25	25
39	2	1	1	3	1	1	5	3	2	3	2	3	1	3	2	1	2	1	2	1	1	2	3	1	3	2	4	25	25
40	2	2	1	5	1	1	5	3	2	3	2	3	1	2	2	1	2	1	2	1	1	2	2	1	1	2	2	21	21
41	3	1	1	5	1	1	5	3	3	3	3	2	1	3	2	1	2	1	2	1	1	2	4	1	1	2	4	20	20
42	3	1	1	2	1	1	4	4	3	3	3	3	1	3	2	1	1	3	1	3	1	2	3	1	1	2	3	24	24
43	3	2	1	4	1	1	4	3	2	3	2	3	1	2	2	1	1	2	1	2	1	3	3	1	3	2	4	25	25
44	2	2	3	5	1	1	5	3	2	4	2	3	1	4	2	1	1	3	1	3	2	2	4	1	3	2	4	23	23
45	2	2	3	5	1	1	5	3	3	3	3	2	1	2	2	1	2	1	2	1	2	2	2	1	1	2	2	21	22
46	1	2	1	5	2	2	5	1	2	3	3	2	1	2	2	1	2	1	2	1	2	2	2	1	1	2	2	21	24
47	1	1	1	5	1	1	5	2	2	2	3	2	1	2	2	1	2	1	2	1	1	2	3	1	1	2	4	23	15
48	2	1	1	5	1	1	5	1	2	2	2	2	1	2	2	1	1	3	1	3	1	2	3	1	3	2	4	20	19
49	3	2	2	5	1	1	5	3	2	4	3	2	1	3	2	1	1	2	1	2	1	2	4	1	3	2	4	20	17
50	3	1	1	3	1	1	5	3	2	3	2	2	1	1	2	1	1	2	1	2	1	3	4	1	3	2	4	18	19
51	3	1	1	3	1	1	5	3	2	3	3	2	1	1	2	1	1	2	1	2	2	3	4	1	3	2	4	25	15
52	3	2	3	3	1	1	5	3	3	3	2	2	1	1	2	1	1	2	1	2	2	3	4	1	3	2	4	19	20
53	2	2	3	5	1	1	5	2	3	3	2	2	1	1	2	1	1	3	1	3	1	3	4	1	3	2	4	21	18
54	1	2	1	5	2	2	5	1	3	3	2	3	1	3	2	1	1	3	1	3	1	3	4	1	3	2	2	24	16
55	1	1	1	3	1	1	4	3	3	3	2	3	1	3	2	1	1	3	1	3	2	2	2	1	3	2	4	18	20
56	2	1	1	3	1	1	5	3	3	3	3	3	1	4	2	1	1	2	1	2	2	2	2	1	3	2	4	25	15
57	3	1	1	3	1	1	5	4	3	3	3	3	1	1	2	1	1	2	1	2	1	2	2	1	3	2	3	20	18
58	3	2	1	5	1	1	5	3	3	3	3	2	2	1	2	1	1	3	1	3	1	2	2	1	1	2	4	22	20
59	3	1	3	5	1	1	5	3	3	3	3	2	1	1	2	1	1	3	1	3	1	2	2	1	3	2	2	23	17
60	3	2	1	5	1	1	5	3	3	3	3	2	1	2	2	1	1	3	1	3	1	2	2	1	3	2	2	19	20

APPENDIX - XVI

PHOTOGRAPHS DURING DATA COLLECTION